

EXHIBIT 10

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION**

INTELLECTUAL TECH LLC,

Plaintiff,

v.

ZEBRA TECHNOLOGIES
CORPORATION,

Defendant.

Case No. 6:19-cv-00628-ADA

DECLARATION OF DR. JEFFREY J. RODRIGUEZ RE VALIDITY

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

TABLE OF CONTENTS

I.	Introduction.....	3
II.	Qualifications, Publications, and Prior Testimony	3
III.	Materials Considered	5
IV.	Legal Principles	6
	A. Standard of Proof	6
	B. Interpretation of Claims	6
	C. Written Description.....	7
V.	The ‘247 Patent	8
	A. Summary of the ‘247 Patent	8
	B. Prosecution History of the ‘247 Patent	14
	1. Original Prosecution	14
	2. <i>Ex Parte</i> Reexamination	15
	C. Claims of the ‘247 Patent.....	15
VI.	Invention Date and Ordinary Skill in the Art.....	16
VII.	Claim Construction	17
VIII.	Summary of Opinions	17
IX.	Validity Analysis	17
	A. Disclosure of Processor Phrase	18
	B. Specific Structure of the Components Is Disclosed.....	18
	C. Interaction of the Components Is Disclosed	21
	D. POSITA Would Have Understood How to Output an Adapted Signal	22
	1. Adapting an Output Signal.....	23
	2. Configuring a Processor to Output a Signal	25
	3. Flexibility of Communicating with Devices.....	25
	E. “When” Does Not Mean “At the Time of”	26
	F. FIG. 4 and Its Description Disclose an Algorithm	28
	1. Which Component Performs the Steps	28
	2. The Steps to Engage or Disengage a Device	29
	G. RFID Base Unit Is Not Required to Operate Devices or Use an Algorithm	31

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

I, Jeffrey J. Rodriguez, hereby declare as follows:

I. INTRODUCTION

1. I have been retained by Plaintiff, Intellectual Tech LLC (“Intellectual Tech”) to investigate and opine on certain issues relating to U.S. Patent No.7,233,247 (“the ‘247 patent”). I understand the ‘247 patent has been asserted by Intellectual Tech against Defendant, Zebra Technologies Corp. (“Zebra”) in the above-captioned case. In particular, I have been asked to provide my opinions regarding Zebra’s motion for summary judgment of invalidity regarding written description. In providing that opinion, I have also been asked to review and opine on the opinions and statements made by Zebra’s expert, Dr. Sharony.

2. I am being compensated for my work in this matter at my customary consulting rate. Neither my engagement nor my compensation depends on the outcome of this matter.

II. QUALIFICATIONS, PUBLICATIONS, AND PRIOR TESTIMONY

3. I am a professor at the University of Arizona in the Department of Electrical and Computer Engineering, where I hold or have held the following positions: (a) Associate Professor of Electrical and Computer Engineering, with tenure (1997-present), (b) Associate Professor of Biomedical Engineering, with tenure (2017-present), (c) Director of the Signal and Image Laboratory (1990-present), (d) Director of Image Analysis, Cancer Imaging Shared Services, Arizona Cancer Center (2009-2014), (e) Co-Director of Connection One, a National Science Foundation industry/university cooperative research center for wired and wireless communication circuits and systems, (f) Director of Graduate Studies for the Department of Electrical and Computer Engineering (2000-2003, 2005-2016). A copy of my current curriculum vitae is attached as Exhibit A, which includes a list of my prior publications and a list of cases in which I have testified as an expert at deposition or trial.

4. My formal education includes a bachelor's degree in Electrical Engineering from the University of Texas at Austin in May 1984, a master's degree in Electrical Engineering from the Massachusetts Institute of Technology in June 1986, and a Ph.D. Degree in Electrical Engineering from the University of Texas at Austin in May 1990.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

5. I teach courses at both the graduate and undergraduate level through the Dept. of Electrical and Computer Engineering and the College of Optical Sciences. The courses I have taught include Circuit Analysis (ECE 320), Signals and Systems (ECE 340), Digital Signal Processing (ECE 429/529), Advanced Digital Signal Processing (ECE 528), Digital Image Processing (ECE/OPTI 533), and Digital Image Analysis (ECE/OPTI 532).

6. My research activity is generally directed to systems for automated digital signal/image/video processing and analysis. Examples of my current and past research projects include automobile detection and tracking in aerial video of urban traffic scenes, a real-time video processing system for detection and tracking of zebrafish, segmentation of rock particles in images for mining applications, tongue detection and tracking using ultrasound video, Voice Over Internet Protocol (VOIP) in wireless communication systems, performance evaluation of superpixel algorithms for image segmentation, and machine learning techniques for image classification applications.

7. Some of my research has focused on wireless communication systems. For example, we developed an adaptive jitter buffer play-out scheme to improve Voice Over Internet Protocol (VOIP) quality in wireless networks. Also, we investigated the use of genetic algorithms for optimization of wireless devices. For example, we utilized genetic algorithms to design linear array antennas having distributions with low sidelobes and aperture efficiency constraints on the specified peak amplitude and effective radiated voltage.

8. One of my recent research has involved the design and development of a real-time image and video processing system for automated behavioral analysis of zebrafish for use in ototoxicity assessment of drugs. The system we designed and built includes an array of Raspberry Pi microcomputer systems configured with video cameras for parallel video capture of sixteen zebrafish populations. Each Raspberry Pi features a system on a chip, which includes a CPU, a video graphics processing unit (GPU), a disk storage system, and a memory system. Our zebrafish analysis system automatically captures and transmits video data to a high-performance cluster to implement customized algorithms for further video processing and analysis, resulting in automated assessment of zebrafish swimming behavior.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

9. Almost all the aforementioned projects have involved the use and programming of processors. In addition, my education, industry experience, and consulting experience have all involved significant work related to hardware interfacing of processors and devices and programming of processors. Therefore, I have extensive hardware and software experience related to processors.

10. I am a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) and the IEEE Signal Processing Society. I served as General Chair of the 2016 IEEE Southwest Symposium on Image Analysis and Interpretation (SSIAI), and General Chair of the 2007 IEEE International Conference on Image Processing (ICIP). In 2020 I served on a grant review panel for the Division of Computing and Communication Foundations at the National Science Foundation. In addition, during 2005-2011, I served on the IEEE Signal Processing Society Technical Committee on Image, Video, and Multidimensional Signal Processing. Over the years, I have served on numerous other professional committees, and I have served as a technical reviewer for numerous journals and professional conferences.

III. MATERIALS CONSIDERED

11. In forming my opinions, I have relied on my own knowledge and experience, including my work experience in the field of electrical and computer engineering, my research and teaching experience, my experience in working with others in this field, and my experience in the design, development, and operation of relevant systems. I have considered the claims, specification, and file history of the ‘247 patent. I have also considered Zebra’s Motion for Summary Judgment of Invalidity Under 35 U.S.C. § 112 (“MSJ”) and the Declaration of Dr. Jacob Sharony in Support of Defendant’s Motion for Summary Judgment of Invalidity Under 35 U.S.C. § 112 (“Report”); both documents are dated 10/13/2020. I have also reviewed and analyzed the Claim Construction Order issued by the Court, which is Dkt. 52. In addition, I have also considered the materials listed in Exhibit B to this declaration, as well as the materials described or cited in this declaration.

12. I reserve the right to supplement, amend, or modify the opinions set forth in this declaration or in any other declaration, report, witness statement, deposition, or in testimony based

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

on any new contentions or other information that may emerge in this proceeding, including any other documents, information, materials, or testimony. I also reserve the right to create or assist in the creation of exhibits to assist me in testifying, such as demonstratives, illustrations, summaries, multimedia presentations, drawings, analogies, and animations. I have not yet selected the particular exhibits that may be used.

IV. LEGAL PRINCIPLES

13. I am not an attorney and offer no opinions on the law. I am, however, informed on the following principles of patent law, which I have applied in formulating my opinions stated in this declaration.

A. Standard of Proof

14. I understand that the burden of proving invalidity is on the Defendant, who must prove invalidity by clear and convincing evidence.

15. On summary judgment, I understand the moving party has the initial burden of showing that there is no genuine issue of any material fact and showing that judgment should be entered as a matter of law. The evidence of the nonmoving party is to be believed, and all justifiable inferences are to be drawn in his favor. I understand that if there is a dispute about a material fact that is genuine, that is, if the evidence is such that a reasonable jury could return a verdict for the nonmoving party, summary judgment is not ordinarily granted.

B. Interpretation of Claims

16. I understand that the general rule is that claim terms are generally given their plain-and-ordinary meaning. The plain and ordinary meaning of the term is the meaning that term would have to a person of ordinary skill in the art in question at the time of the invention. I understand that although the specification may aid in understanding the plain and ordinary meaning of a term, particular embodiments and examples appearing in the specification should not be generally read into the claims. Absent a clear indication in the intrinsic record, I understand particular embodiments and examples appearing in the specification should not be generally read into the claims even if the specification only provides a description of a single embodiment.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

17. I further understand that extrinsic evidence can also be useful in determining the meaning of a term but that it is less significant than the intrinsic record in determining the legally operative meaning of claim language. Technical dictionaries may be helpful, but they may also provide definitions that are too broad or not indicative of how the term is used in the patent. I understand that an expert's testimony may also be helpful but that it must be supported and not conclusory.

18. I understand that there are only two exceptions to the general rule that claims should be given their plain and ordinary meaning: (1) when the patentee acts as his/her own lexicographer or (2) when the patentee disavows the full scope of the claim term in the specification or during prosecution. To act as his/her own lexicographer, the patentee must clearly set forth a definition of the disputed claim term, and clearly express an intent to define the term. To disavow the full scope of a claim term, the patentee's statements in the specification or prosecution history must represent clear and unmistakable disavowal of scope. Accordingly, I understand that when an applicant's statements are amenable to multiple reasonable interpretations, they cannot be deemed clear and unmistakable.

C. Written Description

19. I understand that the issue of whether a claimed invention satisfies the written description requirement is a question of fact. I understand that in order to determine if the patent has satisfied the written description requirement of the patent statute, its disclosure must reasonably convey to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.

20. I understand that written description is about whether the skilled reader of the patent disclosure can recognize that what was claimed corresponds to the teachings of the patent and that the issue is not about whether the patentee has proven to the skilled reader that the invention works, or how to make it work. The test, I understand, requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art.

21. To satisfy the written description requirement, the patent does not have to exactly describe the subject matter claimed or use the same terms as used in the claims, but the specification of the patent must contain an equivalent description of the claimed subject matter. I

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

understand that factors for evaluating the adequacy of the disclosure include the existing knowledge in the particular field, the extent and content of the prior art, the maturity of the science or technology, and the predictability of the aspect at issue.

V. THE ‘247 PATENT**A. Summary of the ‘247 Patent**

22. The ‘247 patent, titled “Method and System for Employing RFID Tags in Automated Applications,” was issued to Adam Crossno et al. on June 19, 2007. The ‘247 patent derives from U.S. Patent Application No. 11/039,221 (“patent application”), which was filed on Jan. 20, 2005. The patent underwent reexamination and issued on June 7, 2019, with Claims 16-163.

23. The ‘247 patent relates to a method and apparatus for Radio Frequency Identification (“RFID”). ‘247 patent at Abstract. It discloses an RFID base unit that can communicate with different types of RFID tags and any number of devices, “which allow for dynamic access and updates to tailor the RFID base unit for virtually any situation.” *Id.*; *see also* Dkt. 52, Claim Construction Order, at 2. The claimed RFID base unit is useful, for example, in “safety and/or security applications to enable or disable automated devices” (*id.*), “to discontinue the operation of other devices” (*id.* at 5:51-52), or “to gain access to a device or area” (*id.* at 6:33-34). *See also id.* at 5:50-6:54.

24. According to the ‘247 patent, RFID base units were tailored only for specific types of tags and for specific applications, creating inflexible systems. *Id.* at 3:14-17. At the time of the invention, RFID base units were also not easily monitored, leaving users unaware of an RFID base unit’s status or operation. *Id.*; *see also id.* at 5:24-27. “Once the at least one RFID tag interfaces with the RFID base unit,” the ‘247 patent teaches in the Summary of the Invention, “indicia of engagement, disengagement or other effect on the control or operation is communicated to the external device.” *Id.* 3:31-36; *see also* Dkt. 52, Claim Construction Order, at 2. I understand the “indicia of engagement” to be the transmission of a signal. *See, e.g., id.* at 5:43-65. To confirm that understanding, I note, for example, that the specification teaches the claimed RFID base unit can send and receive “digital and/or relay signals”:

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

The RFID base unit 304, though, has significant potential in controlling the operation of other external devices. For example, the RFID base unit 304 could be coupled to an automated device 330 by a communication channel 328. Automation equipment 330 can also be connected directly to the I/O module. The RFID base unit 304 can then enable or disable access to the automated device 330. The RFID base unit 304 can also be coupled to an I/O device 338 through the communication channel 340, *where the RFID base unit 304 can be configured to receive and/or transmit digital and/or relay signals.*

Id. at 5:37-50.

25. In one embodiment, the specification teaches that the RFID base unit “can also be used to discontinue the operation of other external devices.” *Id.* at 5:51-52. In that regard, the specification describes that “the RFID base unit 304 could be employed *to signal a controller* if the proper operator is not present and/or in an acceptable location to operate a device.” *Id.* at 5:60-65. One skilled in the art understands that in order to “signal a controller,” the RFID base unit sends a signal. To send that signal, the ‘247 patent teaches that the RFID base unit must “interface”—i.e., come in the proximity of or otherwise engage—an RFID circuit of an RFID tag. *See* ‘247 patent at 3:31-36.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

26. Figure 3 provides an illustration of an embodiment of the ‘247 patent:

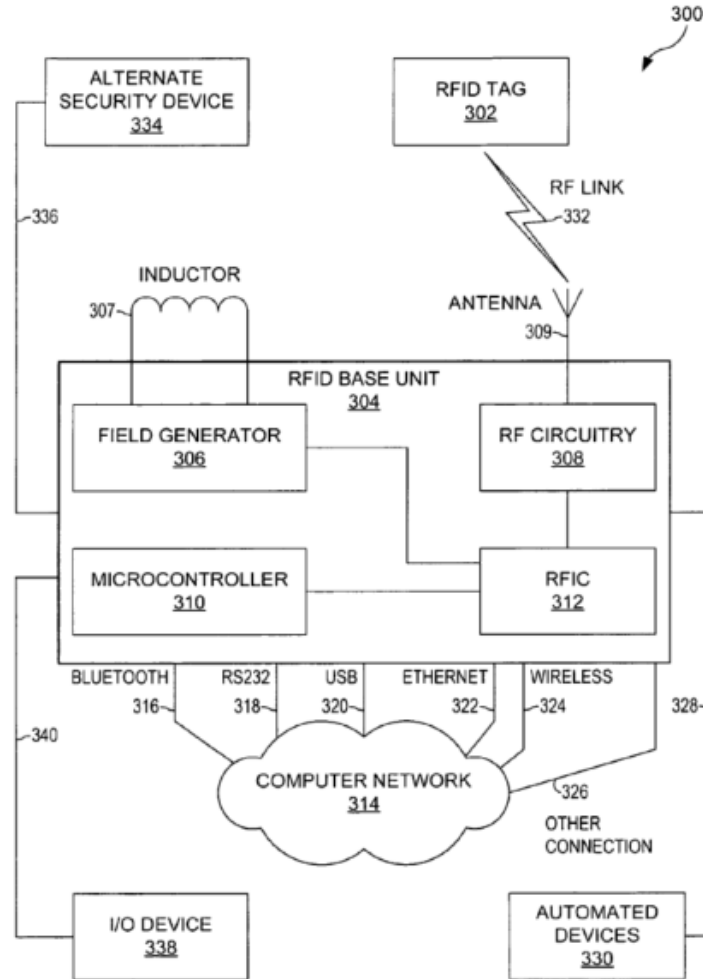


FIG. 3

27. With reference to Fig. 3, the ‘247 patent teaches an RFID base unit that includes an RF circuitry 308, an antenna 309, a microcontroller 310, and an RF Integrated Circuit (RFIC) 312. ‘247 patent at 4:24-30; Fig. 3. “[B]ased on the configuration desired, the RFID base unit 304 can be coupled to a variety of other devices.” *Id.* 4:61-62. In order to do so, the ‘247 patent teaches a “flexible” microcontroller that includes memory (such as expandable volatile memory, DRAM, hard disk drives, flash memory sticks and the like), an operating system, and the ability to communicate with a computer networks and devices of various kinds through communication channels (such as Bluetooth, RS232, USB, Ethernet, and other wireless and wired technologies). *Id.* at 4:61-5:16.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

28. The ‘247 patent further teaches that the RFIC is coupled to the RF circuitry and the microcontroller through the communication channels, and the RF circuitry “communicates information to and from the RFID tag 302 by utilizing the antenna 309 and the RF link 332.” *Id.* 4:25-33. As discussed above, “communicat[ing] information to and from the RFID tag” occurs when the base unit and the RFID tag “interface.” *Id.* at 3:31-32 (“An RFID tag then interfaces with the RFID base unit...”). After the RFID base unit and the RFID tag have established communication, the RFID base unit can send a signal to an external device. *Id.* at 3:33-36 (“Once the at least one RFID tag interfaces with the RFID base unit, indicia of engagement, disengagement or other affect [*sic*] on the control or operation is communicated to the external device.”).

29. Figure 4 provides a flowchart illustrating an embodiment of the ‘247 patent:

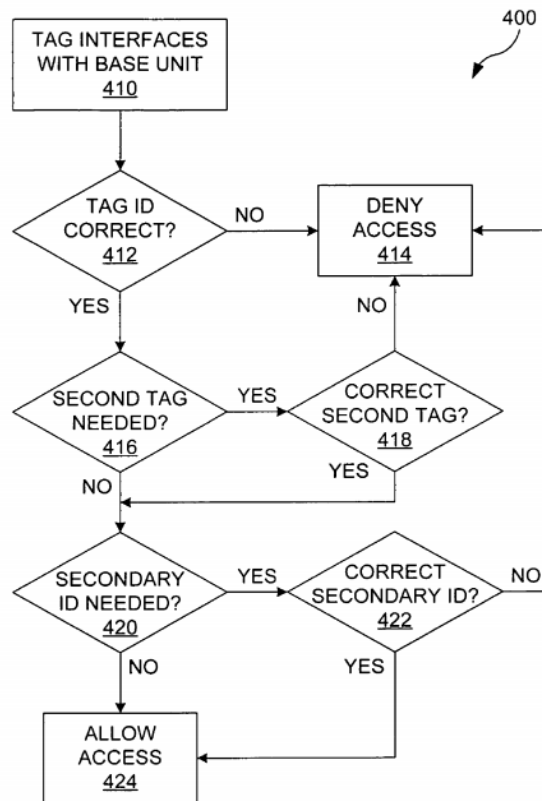


FIG. 4

30. With regard to Figure 4, it illustrates an example of the functionality of the claimed RFID base unit within an RFID system in an industrial application using an algorithm provided in the form of a flowchart. ‘247 patent at 6:17-21. One of ordinary skill in the art would understand

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

this flowchart to be an algorithm for how the claimed RFID base unit would operate in a particular situation.

31. As provided in the ‘247 patent, in the first step of the algorithm, an RFID base unit interfaces with an RFID tag, energizing the tag and receiving its identification information (ID). *Id.* at 6:22-25. Depending on whether the ID is correct, access to a device or area is granted or denied. *Id.* at 6:26-29; *see also id.* at 6:29-45. If the ID is correct, in some applications, a determination is made as to whether a secondary ID is needed, such as biometric information or ID from a tag of a second accompanying user. *Id.* at 6:45-53. Finally, access is granted or denied. *Id.* Allowing access to a device or area requires the RFID base unit to communicate its determination to a device through communication channels such as Bluetooth using a signal. *See, e.g., id.* at 3:26-36; 4:61-5:16; 5:37-50. The RFID base unit sends that signal when it is in communication with an RFID tag. *Id.*

32. The ‘247 patent explains that in a preferred embodiment the functions described “are performed by a processor in accordance with code such as computer program code, software, and/or integrated circuits that are coded to perform such functions.” ‘247 patent at 4:7-12.

33. Based on my review of the file history, I note that the originally submitted claims of the ‘247 patent included embodiments describing “a processing system” that was coupled to the RFIC and, in some cases, an operating system and/or a microcontroller. *See Patent application at 18.*¹ Those claims are shown below:

¹ I understand that counsel has provided exhibits excerpted from the file history that I have described here. To reduce the complexity of the number of exhibits attached, I refer to only the exhibit name here but reference the exhibits attached to Intellectual Tech’s Response.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

5. The RFID base unit of Claim 1, wherein the control module further comprises:

a processing system; and

an RF Integrate Circuit (RFIC) at least coupled to the RF circuit and to the processing system.

7. The RFID base unit of Claim 5, the processing system further comprises an operating system.

8. The RFID base unit of Claim 5, the processing system further comprises:

a microcontroller; and

a memory coupled to the microcontroller.

Patent application at 18.

34. As to the specific lines of code or details of the program needed for the processor to perform the claimed functions, the specification explicitly rejects limiting the inventions of the '247 patent to a single implementation:

In operation, *there a number of configurations that can be employed*. In all of the systems, the RFID tag 302 communicates with the RFID base unit 304 through an RF link 332. Depending on the type of RFID tag 302 desired, the RFID base unit 304 is equipped to communicate with any type of RFID tag. '247 patent at 4:18-24.

Specifically, the RFID base unit 304 is *designed to have a great deal of flexibility*. There are a *large number of combinations* of devices, RFID tags, and *communication techniques that can be employed to yield that flexibility*. Moreover, the RFID base unit 304 is designed to be a lower cost unit so that usage of RFID tags, particularly in commercial and industrial applications, can become more common. '247 patent at 6:9-16.

It is understood that the present invention *can take many forms and embodiments*. Accordingly, several variations may be made in the foregoing without departing from the spirit or the scope of the invention. The capabilities outlined herein *allow for the possibility of a variety of programming models*. This disclosure should not be read as preferring *any particular programming model, but is instead directed*

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

to the underlying mechanisms on which these programming models can be built.

‘247 patent at 6:55-63; *see also* 4:62-64; 5:22-34.

35. Instead, the specification relies on the knowledge of one skilled in the art to program specific functionality of the RFID base unit in accordance with the needs of the application(s) the RFID base unit is used in. *See* ‘247 patent at 7:3-8 (“Many such variations and modifications may be considered desirable by those skilled in the art based upon a review of the foregoing description of preferred embodiments.”).

B. Prosecution History of the ‘247 Patent

36. Based on my review of the prosecution history, I provide the following relevant discussion.

1. Original Prosecution

37. The limitation “a processor wherein . . . the processor is configured for outputting at least one signal adapted to engage or disengage at least one device through at least one connection standard when in communication with an RFID circuit” was a limitation of issued Claim 9 and was incorporated into all of the independent claims of the reexamined claims, including those that are asserted in this case. *See* ‘247 patent at Claim 9. Issued Claim 9 was originally submitted as Claim 31 and amended as follows:

31. An apparatus comprising an RFID base unit at least configured to employ two or more connection standards of a plurality of connection standards and that is configured to engage or disengage at least one device through at least one connection standard when in communication with an RFID circuit.

Patent application at 23.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

31. (currently amended) An apparatus comprising an RFID base unit incorporating a processor wherein the base unit is at least configured to employ two or more connection standards of a plurality of connection standards and ~~that said processor is configured to~~ for outputting at least one signal adapted to engage or disengage at least one device through at least one connection standard when in communication with an RFID circuit.

2007/02/09 Amendment at 4-5.

38. The Applicant summarized the amendment in context of the entire system:

As stated above, the present invention is directed to a base unit and processor (essentially a “smart” reader) 304 that is capable of reading RFID tags of multiple types and making determinations of whether or not the multiple tags read constitute sufficient identification information to warrant outputting a signal to some external device (not a data processing system as shown in Noble) to be controlled through the use of a processor (microcontroller 310).

2007/02/09 Response to Office Action at 8.

39. I note that the Applicant’s statements regarding outputting a signal accord with the specification’s description of the exemplary algorithm provided in Figure 4. *See* ‘247 patent at Fig. 4; 6:17-53; *see also id.* at 3:26-36; 5:37-50.

40. From my review, I understand that the examiner accepted the amendments cited above and issued a notice of allowance. *See* 2007/04/18 Notice of Allowability at 2-3.

2. Ex Parte Reexamination

41. On September 1, 2017, Intellectual Tech requested reexamination of all fifteen claims of the ‘247 patent. *See* 9/1/2017 Request for *Ex Parte* Reexam. During prosecution, Intellectual Tech added “the subject matter of originally issued claim 9” to all pending independent claims in order to address a broadening rejection. 8/29/2018 Reexam Response to Second Office Action at 53-55. With the addition of other minor amendments, the examiner allowed the pending claims and issued a reexamination certificate on June 7, 2019. *See* 4/15/2019 Notice of Intent to Issue Reexam Cert.

C. Claims of the ‘247 Patent

42. My understanding is Claims 48-61, 65-79, 81-90, 117-120, 129-144, 146-147, 149-152, and 154-159 (“Asserted Claims”) have been asserted against one or more accused products.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

As an example, Claim 63 is shown below, where the emphasized phrase is the “processor phrase.” The processor phrase appears in every Asserted Claim.

Claim 63. An apparatus comprising:

a RFID base unit incorporating **a processor wherein** the RFID base unit is at least configured to employ two or more connection standards of a plurality of connection standards and **the processor is configured for outputting at least one signal adapted to engage or disengage at least one device through at least one connection standard when in communication with an RFID circuit**, the RFID base unit further comprising:

an antenna and RF circuitry;

a microcontroller including an operating system and an internal memory comprising static random-access memory (SRAM);

a battery used for powering an integrated circuit; and

a rechargeable battery capable of being charged,

wherein the RFID base unit is configured to communicate using two or more of the following communications protocols: Bluetooth, USB, RS232, wireless, ZigBee or high-frequency RFID.

VI. INVENTION DATE AND ORDINARY SKILL IN THE ART

43. For the purpose of my analysis, I have assumed that the date of the invention is the filing date of the ‘247 patent. In my opinion, the field of art pertaining to the ‘247 patent includes microprocessor-based communication systems. In my opinion, a person of ordinary skill in the art at the time of the invention (“POSITA”) would have had at least a bachelor’s degree in electrical engineering, computer engineering, computer science, or a related field, with one to two years of experience in microprocessor-based and/or RFID communication systems. Significantly more practical experience could also qualify one not having the aforementioned education as a person of ordinary skill in the art while, conversely, a higher level of education could offset a lesser amount of experience.

44. I am qualified as a person having at least this level of skill, and based on my knowledge and experience, I have a good understanding of the knowledge of a POSITA. Indeed, I have participated in professional organizations and have taught, trained, and worked closely with many such persons over the course of my career, including prior to and around the time of the date of the invention.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

VII. CLAIM CONSTRUCTION

45. The Court has provided the claim construction for certain claim terms, which is repeated in the following table, and I have applied the Court’s claim construction for the purpose of my analysis. *See* Dkt. 52, Claim Construction Order, 10/1/2020.

Term	Construction
“battery”	Plain and ordinary meaning
“microcontroller”	Plain and ordinary meaning
“a processor wherein ... the processor is configured for outputting at least one signal adapted to engage or disengage at least one device through at least one connection standard when in communication with an RFID circuit”	Plain and ordinary meaning
“Bluetooth”	Plain and ordinary meaning
“RFID”	Plain and ordinary meaning
“USB”	Plain and ordinary meaning

46. For all claim terms not construed by the Court, I have assumed the plain and ordinary meaning as understood by a POSITA.

VIII. SUMMARY OF OPINIONS

47. Based on my knowledge and experience and the investigation and analysis that I have performed, I have formed the following opinions. It is my opinion that the disclosure of the ‘247 patent conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of January 20, 2005, the filing date of the patent. I explain the basis of my opinion below.

48. To the extent that I do not specifically reference any particular paragraph(s) or portions of paragraphs of the Report by Dr. Sharony (Dkt. 54-16), this does not mean that I agree with or accept any of the arguments made in those paragraphs.

IX. VALIDITY ANALYSIS

49. Below I provide an analysis of the opinions expressed by Dr. Sharony and Zebra in relation to its motion for summary judgment. I reserve the right to supplement these statements based on my further review and analysis of the ‘247 patent and its intrinsic record, any further opinions Dr. Sharony may offer, and any rebuttal Zebra provides.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

A. Disclosure of Processor Phrase

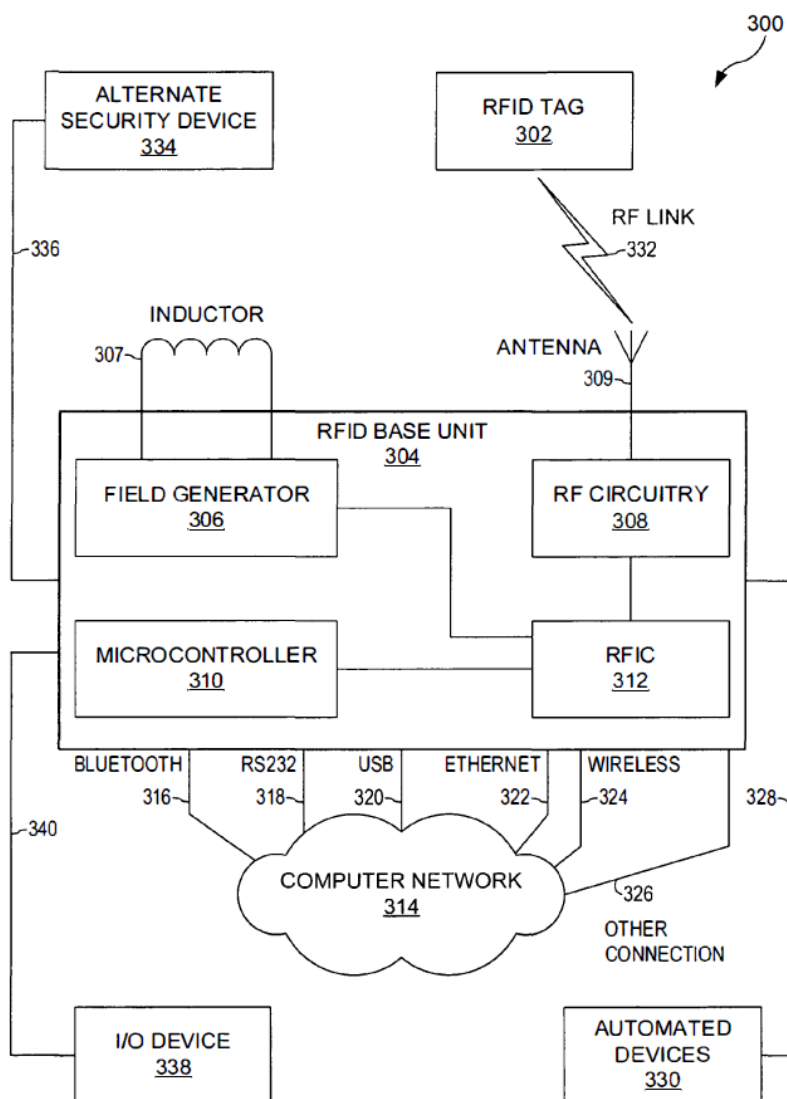
50. Dr. Sharony incorrectly states, “Only a few lines of the ‘247 patent specification bear any cognizable connection to the ‘processor phrase’ of the claims.” Report at ¶ 28. Dr. Sharony incorrectly states, “FIG. 3 does not provide any disclosure concerning the ‘processor’ phrase.” Report at ¶ 22. As I discuss in the following subsections, all of the elements of the “processor phrase” are disclosed in the ‘247 patent.

B. Specific Structure of the Components Is Disclosed

51. Dr. Sharony incorrectly states, “FIG. 3 and its description ... only disclose a generalized block diagram without disclosing: (a) the specific structure of the components of that block diagram;” Report at ¶ 22.

52. FIG. 3, shown below, is a block diagram depicting an embodiment of the claimed RFID system, including various connections between the components of the system.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

**FIG. 3**

53. The description of FIG. 3 discloses specific structure of the components that appear in the figure:

“The microcontroller 310 ... can have memory which would include expandable volatile memory, such as Dynamic Random Access Memory (DRAM) or Static Random Access Memory (SRAM) and non-volatile memory, such as Hard Disk Drives and flash memory sticks. Additionally, standard operating systems, such as Windows CE.RTM. (Microsoft Corp, One Microsoft Way Redmond, Wash. 98052-6399) and VX Works, can be readily usable with the microcontroller 310. The microcontroller 310 can also be equipped to communicate with either a computer network 314, automated devices 330, and other devices through BlueTooth, RS232, Universal Serial Bus (USB), Ethernet, Wireless, T-carrier connections, Firewire®

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

(Apple Computer, Inc., 1 Infinite Loop, Cupertino, Calif. 95014), Optical fiber, Zigbee® (Philips Electronics North American Corp., Avenue of the Americas New York, N.Y. 100201-104), etc.”

‘247 patent at 4:64-5:13.

54. Based on the above and the claims of the ‘247 patent, a POSITA would have understood a processor is included as a part of the microcontroller shown in FIG. 3 and that the structure for the processor includes a digital circuit that can perform the steps of FIG. 4 and output a signal to control an external device. Microcontrollers and processors (and, relatedly, microprocessors) were ubiquitous at the time the ‘247 patent was filed, so a POSITA would have known the specific structure of such components and how to use them within a system.

55. Dr. Sharony states, “The specification simply treats microcontroller 310 as a black box with a single connection to the RFIC 312 of Figure 3.” Report at ¶ 29. Dr. Sharony does not explain what he means by “black box,” and neglects the disclosure of multiple connections to microcontroller 310. The structure of microcontroller 310 is not hidden, mysterious, or unknown. As I discuss in ¶ 53 above, the description of FIG. 3 discloses specific structure of microcontroller 310, and a POSITA would have known the specific structure of a microcontroller and how to use one within a system. Dr. Sharony mentions the single connection between microcontroller 310 and RFIC 312, but does not explain how this fact relates to his argument regarding disclosure of outputting signals. Dr. Sharony overlooked the many other connections to microcontroller 310 that are disclosed in the ‘247 patent but drawn in FIG. 3 as connections to RFID base unit 304 to simplify the diagram. ‘247 patent at FIG. 3. For example, “The microcontroller 310 can also be equipped to communicate with either a computer network 314, automated devices 330, and other devices through BlueTooth, RS232, Universal Serial Bus (USB), Ethernet, Wireless, T-carrier connections, Firewire® (Apple Computer, Inc., 1 Infinite Loop, Cupertino, Calif. 95014), Optical fiber, Zigbee® (Philips Electronics North American Corp., Avenue of the Americas New York, N.Y. 100201-104), etc.” *Id.* at 5:6-16; *see also* FIG. 3. A POSITA would have understood that the phrase “equipped to communicate with” discloses connections or communication channels (including connections 316, 318, 320, 322, 324, and 328, 336, and 340 of FIG. 3) between microcontroller 310 and the named devices following that phrase. *Id.*

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

56. The ‘247 patent states that a processor is the component that performs the functions described in the preferred embodiment, such as the steps shown in FIG. 4’s flow diagram:

“It is further noted that, unless indicated otherwise, all functions described herein may be performed in either hardware or software, or some combinations thereof. In a preferred embodiment, however, the functions are performed by a processor such as a computer or an electronic data processor in accordance with code such as computer program code, software, and/or integrated circuits that are coded to perform such functions, unless indicated otherwise.” *Id.* at 4:5-12.

57. A POSITA would have understood that a microcontroller is a device that contains a processor along with memory and possibly other associated circuits. Thus, microcontroller 310 necessarily includes a processor, and this is the only processor mentioned as part of RFID base unit 304. Thus, microcontroller 310 performs the functions in the ‘247 patent, including the steps shown in FIG. 4’s flow diagram.

58. In one embodiment, microcontroller 310 performs step 410, where “an RFID tag interfaces the RFID base unit,” and this involves communication between microcontroller 310 and RFIC 312 via communication channel 344, which is the “single connection” that Dr. Sharony refers to. *See* ‘247 patent at 4:47-52, 6:22-25, FIG. 3, FIG. 4. Microcontroller 310 performs step 424 to allow access to a device and step 414 to deny access to a device. ‘247 patent at 6:26-53, FIG. 4.

C. Interaction of the Components Is Disclosed

59. Dr. Sharony incorrectly states, “FIG. 3 and its description ... only disclose a generalized block diagram without disclosing: ... (b) how those components interact;” Report at ¶ 22.

60. FIG. 3 and its description disclose how the components of FIG. 3 interact. For example, FIG. 3 discloses a communication channel between microcontroller 310 and RFIC 312, and the specification discloses that “The RFIC 312 is coupled to the RF circuitry 308 and the microcontroller 310 through the communication channels 346 and 344, respectively.” *Id.* at 4:27-30. In other words, microcontroller 310 interacts with RFIC 312 via communication channel 344.

61. Dr. Sharony fails to note that the claims of the patent application also provide disclosure of various embodiments concerning the processor phrase and how the components of

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

FIG. 3 interact. For example, Claim 5 of the patent application discloses “an RF Integrate Circuit (RFIC) at least coupled to ... the processing system.” Patent application at 18. Claim 7 of the patent application discloses that “the processing system further comprises an operating system.” *Id.* Claim 8 of the patent application discloses that “the processing system further comprises: a microcontroller; and a memory coupled to the microcontroller.” *Id.* Claims 15 and 23 of the patent application disclose “communicating indicia of engagement or disengagement to affect control of the external device through at least one communication standard of a plurality of communication standards” “once the at least one RFID circuit interfaces the RFID base unit”. *Id.* at 19-22. Claim 17 of the patent application discloses that communicating further comprises “disengaging the external device when the at least one RFID circuit is engaged.” *Id.* at 20. Claims 19 and 27 of the patent application disclose “determining if the at least one RFID circuit is allowed to enable or disable the external device.” *Id.* at 20, 22. Claims 20 and 28 of the patent application disclose “determining if additional personnel are required to enable or disable the external device.” *Id.* Claim 31 of the patent application discloses an apparatus “configured to engage or disengage at least one device through at least one connection standard when in communication with an RFID circuit.” *Id.* at 23.

D. POSITA Would Have Understood How to Output an Adapted Signal

62. Dr. Sharony incorrectly states, “FIG. 3 and its description ... only disclose a generalized block diagram without disclosing: ... (c) what, if any, specific signals in the components output to other components or how those signals might be adapted.” Report at ¶ 22. Referring to FIG. 3, Dr. Sharony asserts that “From this block diagram, a POSITA would not understand how to output a signal adapted to engage or disengage a device” *Id.* Dr. Sharony asserts that “There is nothing in FIG. 4 or its description about: (a) outputting a signal, (b) how any outputted signal would be adapted; (c) how any outputted adapted signal would engage or disengage a device through a connection standard; ...” *Id.* at ¶ 24. But he incorrectly assumes that FIG. 3 or FIG. 4 by themselves must provide such disclosure. Instead, we must assume that a POSITA would have the benefit of all the assumed knowledge of a POSITA as well as the entirety of the disclosure provided by the ‘247 patent, not just FIG. 3 and FIG. 4. Dr. Sharony incorrectly

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

asserts that “a POSITA would not be able to determine how to program the processor to output a signal ‘adapted to engage or disengage at least one device.’” *Id.* at ¶ 41.

1. Adapting an Output Signal

63. A POSITA would know how to determine how to adapt an output signal to engage or disengage a device. Indeed, Dr. Sharony concedes the following:

“A POSITA would know that there are multiple possible ways for the processor to carry out the claimed signal step. For example, external device A (e.g., a printing machine) could have an internal logic module that when receiving (e.g., via Bluetooth) the string ‘11111111’ it enables the device and when receiving the string ‘10011001’ it disables the device. On the other hand, external device B (e.g., a drilling machine) could have an internal activation/deactivation relay that depends on the frequency of received pulses (e.g., also sent via a Bluetooth connection). If the pulse frequency is high (e.g., 100 pulses per second or more) the relay is activated and when the pulse frequency is low (e.g., 10 pulses per second or lower) the relay is deactivated. Another example, of high security application, is when external device C uses an internal deciphering module (e.g., Public Key Infrastructure or PKI) for its activation/deactivation. Here, the external device accepts an activation/deactivation command only if it verifies the authenticity of the controlling device (i.e., the sender). In addition to the above examples, there could be other possibilities as well that depend specifically on the design and implementation of the external device.” *Id.* at ¶ 42.

64. A POSITA would have known the protocol for communicating an “engage” or “disengage” signal to a particular device. For example, assume external device A (e.g., a printing machine) has an internal logic module that receives via Bluetooth the string “11111111” to engage the device and the string “10011001” to disengage the device. For such a device, a POSITA would have known how to configure the processor for outputting a signal adapted to send the string “11111111” to engage the device or the string “10011001” to disengage the device through the Bluetooth connection standard. The Bluetooth connection standard has been an industry specification for short-range radio frequency (RF)-based connectivity for portable personal devices. For example, the 2002 version of the IEEE 802.15.1 standard disclosed the detailed requirements for communicating via a Bluetooth connection. A POSITA would have known the associated protocol for communicating with the particular device and would not need to

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

experiment with a multitude of possible implementations. No undue experimentation would have been required.

65. Dr. Sharony explains that adapting a signal to engage or disengage a device depends on the specific external device and that this “requires consideration of both the command being issued as well as the device being controlled.” *Id.* But he strangely refers to this dual consideration as “a two-sided problem”, which somehow leads him to conclude that “The ‘247 patent specification does not provide disclosure on how to address either of these problems.” To the contrary, a POSITA would find it quite clear how to address the two issues.

66. First, to determine the command being issued, one must simply look to FIG. 4 of the ‘247 patent, which discloses when to allow access (block 424) and when to deny access (block 414). Certainly, a POSITA would have understood that to allow access to a device, the output signal is adapted to engage the device, and to deny access the output signal is adapted to disengage the device.

67. Second, after determining whether to engage or disengage a device, a POSITA would easily be able to determine the appropriate method of adapting an output signal based on consideration of the device being controlled. In fact, Dr. Sharony has effectively conceded this fact, as I explained above at ¶ 63. Dr. Sharony refers to “the multitude of possible implementations” of an adapted output signal, but this is misleading. For the at least one device being controlled, a POSITA would have known the associated protocol for adapting the output signal to engage or disengage the at least one device and would not need to experiment with a multitude of possible implementations, as I explained above at ¶ 64.

68. Dr. Sharony concedes that FIG. 4 discloses an “Allow Access” step 424 and a “Deny Access” step 414. *Id.* ¶ 38. A POSITA would have understood that the claimed “outputting at least one signal adapted to engage or disengage at least one device” corresponds to the “Allow Access” step 424 and “Deny Access” step 414, respectively, because engaging a device means allowing access and disengaging means denying access to the device. Further, a POSITA would have known how to adapt a signal to engage or disengage a device, as I explained above at ¶ 64.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

2. Configuring a Processor to Output a Signal

69. There are several well-known ways to configure a processor to output a signal to a device. These several ways include, but are not limited to, memory-mapped input/output (I/O) and port-mapped I/O. Additionally, a processor can communicate with a coprocessor or I/O processor, which in turn outputs a signal to a device using memory-mapped I/O or port-mapped I/O.

70. Memory-mapped I/O uses a common address space for interfacing with both memory and other devices. A memory map specifies which address values are associated with the memory and other devices. For example, one could use hexadecimal address range 0000-3FFF to interface to a RAM memory and address range 4000-40FF to interface with a memory-mapped device, such as a Bluetooth transceiver. A common processor architecture includes an address bus and a data bus for interfacing with both memory and memory-mapped devices. To output a signal to a memory-mapped device associated with a specific address, the processor executes instructions to output the specific address to the address bus and a data value to the data bus. An address decoder circuit compares the address to the address range associated with the memory-mapped device, and if it is within the range, then the data value from the data bus is communicated to the device in the form of digital electrical signals.

71. Port-mapped I/O uses dedicated I/O connections or pins on the processor to interface to a device. For example, the Intel 8051 microcontroller has four, 8-bit, bidirectional, bit-addressable I/O ports. Port P0 is physically associated with eight pins of the 40-pin integrated-circuit package; P1 is associated with a different set of eight pins; and likewise for P2 and P3. To output a signal to an I/O port, the processor executes instructions to write data bits to the I/O port, which causes a voltage to appear at each pin of the I/O port to represent the corresponding data bit. Those data bits are then communicated to the device in the form of digital electrical signals.

72. These ways of configuring a processor were well-known at the time of the filing of the patent (Jan. 20, 2005).

3. Flexibility of Communicating with Devices

73. The '247 patent does not disclose only a single way of adapting an output signal, but instead discloses that flexibility is intended. For example, the specification provides the following:

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

“To be able to interact with multiple devices, the microcontroller 310 can be flexible.” ‘247 patent at 4:62-64.

“By equipping the RFID base unit 304 to communicate with external devices, there are a variety of configurations....” *Id.* at 5:22-34.

“Specifically, the RFID base unit 304 is designed to have a great deal of flexibility. There are a large number of combinations of devices, RFID tags, and communication techniques that can be employed to yield that flexibility.” *Id.* at 6:9-12; *see also* 6:54-62, 6:64-7:8.

74. As I discussed above at ¶ 64, a POSITA would have known the communication protocol(s) for the at least one device and, thus, would have known how to configure a processor for outputting a signal adapted to engage or disengage the at least one device.

E. “When” Does Not Mean “At the Time of”

75. Referring to FIG. 3, Dr. Sharony asserts that “From this block diagram, a POSITA would not understand ... how [outputting a signal] would happen when in communication with an RFID circuit.” Report at ¶ 22. Dr. Sharony incorrectly states, “There is nothing in FIG. 4 or its description about: ... (d) [outputting an adapted signal to engage or disengage a device] when in communication with an RFID circuit.” *Id.* at ¶ 24. Dr. Sharony incorrectly states, “There is no portion of the specification that provides corresponding written description for the ‘processor’ phrase’s temporal requirement—that the claimed ‘processor’ be ‘configured for outputting’ a specifically adapted signal ‘*when* in communication with an RFID circuit.’” *Id.* at ¶ 32. Regarding the claim limitation “when in communication with an RFID circuit,” Dr. Sharony incorrectly asserts that “there is nothing in the text or figures that a POSITA would have understood to describe this limitation or anything reasonably equivalent to this limitation.” *Id.* at ¶ 35.

76. Dr. Sharony incorrectly states, “Reading the ‘247 patent, a POSITA would understand the word ‘when’ in the asserted claims requires that the processor output the adapted signal *at the time of* communication with an RFID circuit.” *Id.* at ¶ 33. Dr. Sharony incorrectly asserts that “a POSITA would not understand the word ‘when’ in the asserted claims as a conditional word.” *Id.* at ¶ 33. Examination of the usage of “when” in the ‘247 patent makes it clear that the patentee does not intend the word to mean “at the time of.” For example, consider the following instances where “when” is used in the specification:

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

“Control information is provided to the field generator 306 from the RFIC 312 through the communication channel 342, and, **when** desired, the field generator 306 may not be utilized.” ‘247 patent at 4:49-52 (emphasis added).

“Such case where the field generator 306 may not be utilized is **when** the RFID tag is a passive RFID that utilize a reflected wave, such as the tag 100.” *Id.* at 4:52-55 (emphasis added).

“The field generator 306 is coupled to an inductor 307 for generating a magnetic field, **when** indicated, to provide power to a passive or semi-passive RFID tag.” *Id.* at 4:55-57 (emphasis added).

“For example the operators of an industrial press: at least two operators need to be present at all times **when** the equipment is in operation in case someone gets injured such that they cannot get or seek medical attention on their own.” *Id.* at 6:38-41 (emphasis added).

For each of these four instances, replacing “when” with “at the time of”, as Dr. Sharony proposes, leads to a non-sensical result.

77. The claim term “when” does not mean “at the time of,” but instead is consistent with the usage of the term “once” in the ‘247 patent:

“Once the at least one RFID tag interfaces with the RFID base unit, indicia of engagement, disengagement or other affect on the control or operation is communicated to the external device.” *Id.* at 3:33-36. “Once received, the ID is analyzed. A determination is made in step 412 of whether the ID is correct or sufficient to gain access. If the ID is not correct, access to a device or area is denied in step 414.” *Id.* at 6:26-32, FIG. 4. “Once the RFID tags have proven sufficient to gain access to a device or area, a determination is made in step 420 to determine if a secondary ID is needed.” *Id.* at 6:45-47, FIG. 4.

Once the processor communicates with an RFID circuit or tag to determine its ID, then the processor outputs a signal adapted to engage or disengage the device based on whether the ID is correct or sufficient to gain access to the device. “For example, if an employee attempts to operate a milling machine and if the employee’s ID is not cleared to operate the milling machine, then the mill will not function.” *Id.* at 6:29-32.

78. Additionally, the claim term “when” cannot mean “at the time of” because the steps in the FIG. 4 flowchart, illustrating the preferred embodiment, are performed sequentially, as a POSITA would have understood. *Id.* at FIG. 4, 6:26-53. In step 410, the processor communicates

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

with the RFID tag or circuit to receive a tag ID. *Id.* Next, the processor determines whether the tag ID is correct (step 412). *Id.* Based on this determination, the processor outputs either an Allow Access signal (step 424) or a Deny Access signal (step 414). *Id.* If the claim term “when” is construed to mean “at the time of,” as Dr. Sharony insists, then the Asserted Claims would not read onto the preferred embodiment because the outputting of a signal would have to occur at the time of the communication with the RFID tag or circuit in step 410; thus, the processor would not yet know whether to output an Allow Access signal or a Deny Access signal.

79. “Alternatively or additionally, the RFID base unit 304 could be employed to signal a controller if the proper operator is not present and/or in an acceptable location to operate a device, such as a laser or other potentially harmful or otherwise important equipment.” *Id.* at 5:61-65. In such a situation, the processor would query the RFID tag to determine whether an approved ID is present, and once this is verified, the processor would output a signal adapted to engage the device. The processor would continually query the RFID tag to determine whether an approved ID is still present, and once it determines the presence has ended, it would output a signal adapted to disengage the device. A POSITA would understand that the claimed phrase “when in communication with an RFID circuit” encompasses such a situation.

F. FIG. 4 and Its Description Disclose an Algorithm

1. Which Component Performs the Steps

80. Dr. Sharony asserts that “neither FIG. 4 itself nor the ‘247 patent’s description of FIG. 4 ... discloses *which* component performs the steps shown in FIG. 4’s flow diagram.” Report at ¶ 22. But he incorrectly assumes that FIG. 4 alone must provide such disclosure. Instead, we must assume that a POSITA would have the benefit of the assumed knowledge of a POSITA as well as the entirety of the disclosure provided by the ‘247 patent, not just FIG. 4.

81. Dr. Sharony apparently overlooked the passage in the ‘247 patent explaining that a processor is the component that performs the functions in the preferred embodiment, such as the steps shown in FIG. 4’s flow diagram:

“In a preferred embodiment, however, the functions are performed by a processor such as a computer or an electronic data processor in accordance with code such as

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

computer program code, software, and/or integrated circuits that are coded to perform such functions, unless indicated otherwise.” ‘247 patent at 4:7-12.

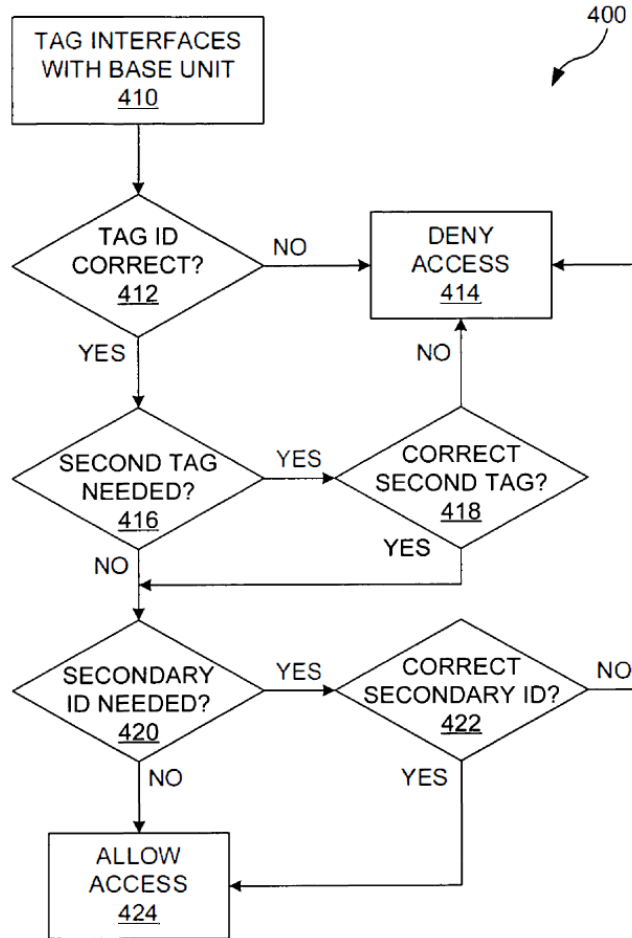
82. A POSITA would have understood that a processor such as the one associated with microcontroller 310 is typically configured with software to perform a specific task by executing a sequence of instructions or steps, such as those provided in Fig. 4. *Id.* at FIG. 3, 4:7-12, 4:62-5:5.

2. The Steps to Engage or Disengage a Device

83. Dr. Sharony incorrectly states that “the specification does not disclose an algorithm with which the microcontroller 310 would create and output signals.” Report at ¶ 29. Dr. Sharony incorrectly states, “neither FIG. 4 nor its description discloses an algorithm for performing the ‘processor’ phrase.” *Id.* at ¶ 24.

84. The flowchart in FIG. 4, shown below, discloses a finite sequence of steps to perform, i.e. an algorithm, to engage or disengage a device when in communication with an RFID circuit.

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

**FIG. 4**

85. The FIG. 4 description in the specification provides further disclosure concerning the sequence of steps to perform to engage or disengage a device when in communication with an RFID circuit:

“In step 410, an RFID tag interfaces the RFID base unit. ... During the interface, ... the identification information (ID) is transmitted to the RFID base unit. Once received, the ID is analyzed. A determination is made in step 412 of whether the ID is correct or sufficient to gain access. If the ID is not correct, access to a device or area is denied in step 414. For example, if an employee attempts to operate a milling machine and if the employee's ID is not cleared to operate the milling machine, then the mill will not function.” ‘247 patent at 6:22-32; *see also* 6:17-53.

A POSITA would have understood the “ALLOW ACCESS” step and the “DENY ACCESS” step in FIG. 4 refer to outputting a signal to engage and disengage a device, respectively.

86. To be clear, however, I do not believe that such an algorithm is necessary for a POSITA to know and understand the structure of the recited processor (or microcontroller) or the

CONFIDENTIAL – OUTSIDE COUNSEL ONLY – SOURCE CODE

processor phrase in the Asserted Claims. As I explain above, processors and microcontrollers were well known in the art and have specific circuitry and may be configured in a variety of ways that are familiar to those skilled in the art. The processor phrase similarly provides structure on its face without the need for an algorithm. My opinions simply rebut the assertions Dr. Sharony makes.

G. RFID Base Unit Is Not Required to Operate Devices or Use an Algorithm

87. Dr. Sharony says “the ‘247 patent specification does not explain how the RFID base unit operates external devices [and] does not disclose any algorithm by which the base unit would control any external device in the manner recited in the claims.” Report at ¶ 21. But the Asserted Claims do not say the base unit “operates” anything. Instead, the base unit incorporates a processor configured for “outputting at least one signal adapted to engage or disengage at least one device.” Likewise, the Asserted Claims do not say the base unit uses any “algorithm.” Since “operates” and “algorithm” are not requirements of the Asserted Claims, there should be no related disclosure requirement.

88. Nevertheless, FIG. 4 and its description disclose an algorithm by which the base unit would control an external device in the manner recited in the claims, as I discuss in Sect. IX. F.

Oath

89. I do hereby declare and state, under penalty of perjury, that all of the foregoing statements are true, or I believe them to be true to the best of my knowledge, information, and belief.



Jeffrey J. Rodriguez

Nov. 18, 2020

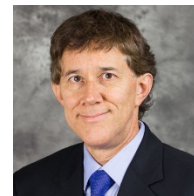
Date

EXHIBIT A

Jeffrey J. Rodriguez, Ph.D.

5658 Caminito Genio
La Jolla, CA 92037

520-360-1860 (C)
jrod2718@gmail.com



Overview

Prof. Rodriguez has extensive experience in the field of electrical and computer engineering. His areas of expertise include signal/image/video processing and analysis, biomedical data analysis, communication systems, microprocessor systems, electric circuits, and related software development. At the University of Arizona, he is a faculty member in the Dept. of Electrical and Computer Engineering and Director of the Signal and Image Laboratory (SaIL).

He served as Co-Director of Connection One, a National Science Foundation multi-university research center on communication circuits and systems. In addition to more than 150 publications in the field, he has been very active in professional activities as a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) and the IEEE Signal Processing Society.

Prof. Rodriguez served as General Chair of the 2016 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI). In addition, during 2005–2011 he served on the IEEE Signal Processing Society Technical Committee on Image, Video, and Multidimensional Signal Processing. He served as General Chair of the 2007 IEEE Intl. Conf. on Image Processing (ICIP), as well as General Chair of SSIAI 2014, General Chair of SSMSD 2003, General Chair of SSIAI 1998, and Vice Chair of SSIAI 2004, as well as positions on numerous other professional committees. From 1996 to 2000, Prof. Rodriguez was Associate Editor of the journal, *IEEE Transactions on Image Processing*.

Expertise

Image processing & analysis (filtering, enhancement, segmentation, pattern recognition, restoration, super-resolution, JPEG, watermarking, inpainting, etc.)

Video processing & analysis (filtering, enhancement, segmentation, pattern recognition, motion estimation, tracking, MPEG, watermarking, etc.)

Signal processing & analysis (speech, audio, filtering, Fourier analysis, etc.)

Biomedical data analysis

Computational photography (deblurring, enhancement, high dynamic range imaging, super-resolution, etc.)

Communication systems (signal conditioning, data compression, image & video communication, etc.)

Microprocessor systems (interfacing, programming, etc.)

Electric circuits (analog and digital)

Software analysis (C, C++, MATLAB, etc.)

Education

Ph.D., The University of Texas at Austin, Electrical Engineering, May 1990

S.M., Massachusetts Institute of Technology, Electrical Engineering, June 1986

B.S., The University of Texas at Austin, Electrical Engineering, May 1984

Employment

- 1990–present: The University of Arizona
 - 1997–present, Associate Professor of Electrical and Computer Engineering, with tenure
 - 2017–present, Associate Professor of Biomedical Engineering, with tenure
 - 2000–2003, 2005–2016: Director of ECE Graduate Studies
 - 2002–2017: Faculty member in the Biomedical Engineering Graduate Interdisciplinary Program
 - 2009–2014, Director of Image Analysis, Cancer Imaging Shared Services, Arizona Cancer Center
 - 2003–2008: Co-Director of Connection One, a National Science Foundation industry/university cooperative research center for communication circuits and systems
 - 1990–1997: Assistant Professor of Electrical and Computer Engineering
- 1986–1990: The University of Texas at Austin, Graduate Research Assistant in Dept. of Electrical Engineering
- 1985: Massachusetts Institute of Technology, Graduate Research Assistant in Dept. of Electrical Engineering
- 1982–1985 (summers): IBM Corp. (Austin, Texas) – hardware design and system programming
- 1980–1981 (summers): Texas Instruments, Inc. (Austin, Texas) – software quality assurance

Consulting

Deposed 12 times. Testified in court 5 times.

Confidential ITC Matter

Dates: Nov. 2020 –

Confidential U.S. Dist. Ct. Matter

Dates: Oct. 2020 –

Confidential IPR Matter

Dates: Oct. 2020 –

Confidential ITC Matter

Dates: Sept. 2020 –

Inter Partes Review of Patent No. 8,339,493, Case IPR2020-00597

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board

Dates: Feb. 2020 –

Client: Apple Inc. (pet.)

Patent Owner: Maxell, Ltd.

Counsel: Erise IP

Technology: Image processing for electronic camera; resolution

Inter Partes Review of Patent No. 6,349,154, Case IPR2020-00479

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board

Dates: June 2019 –

Client: Google LLC (pet.)

Patent Owner: Uniloc 2017 LLC

Counsel: Paul Hastings LLP

Technology: Image and video data compression systems

Inter Partes Review of Patent No. 6,329,934, Case IPR2020-00447

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board

Dates: June 2019 –

Client: Google LLC (pet.)

Patent Owner: Uniloc 2017 LLC

Counsel: Paul Hastings LLP

Technology: Image and video data compression systems

In the Matter of Certain Infotainment Systems, Components Thereof, and Automobiles Containing the Same, Inv. No. 337-TA-1119

Court: U.S. International Trade Commission

Dates: Oct. 2018 –

Client: Broadcom, Limited (compl.)

Respondents: Toyota Motor Corporation, Panasonic Corporation, Denso Ten Limited, Renesas Electronics Corporation, Japan Radio Co., Ltd., et al.

Counsel: Steptoe & Johnson LLP

Technology: Graphics/image/video processing for automobile infotainment systems

Deposed April 2019

Testified and cross-examined at trial, June 2019

Inter Partes Review of Patent No. 7,012,960, Case IPR2020-00757

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board

Dates: June 2019 – Aug. 2020

Client: Google LLC (pet.)

Patent Owner: Uniloc 2017 LLC

Counsel: Paul Hastings LLP

Technology: Image and video data compression systems

Inter Partes Review of Patent No. 6,329,934, Case IPR2020-00448

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board

Dates: June 2019 – July 2020

Client: Google LLC (pet.)

Patent Owner: Uniloc 2017 LLC

Counsel: Paul Hastings LLP

Technology: Image and video data compression systems

Inter Partes Review of Patent No. 9,769,477, Case IPR2019-01035

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board

Dates: April 2019 – Aug. 2020

Client: Google LLC (pet.)

Patent Owner: Realtime Adaptive Streaming LLC

Counsel: Paul Hastings LLP

Technology: Image and video data compression systems

Deposed Feb. 2020

Inter Partes Review of Patent No. RE46,777, Case IPR2019-01037

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board

Dates: April 2019 – Aug. 2020

Client: Google LLC (pet.)

Patent Owner: Realtime Adaptive Streaming LLC

Counsel: Paul Hastings LLP

Technology: Image and video data compression systems

Inter Partes Review of Patent No. 7,386,046, Case IPR2019-01033

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board

Dates: April 2019 – Aug. 2020

Client: Google LLC (pet.)

Patent Owner: Realtime Adaptive Streaming LLC

Counsel: Paul Hastings LLP

Technology: Image and video data compression systems

Confidential IPR Matter

Dates: July 2018 – Sept. 2018

Confidential ITC Matter

Dates: May 2018 – June 2018

Inter Partes Review of Patent No. 8,508,751

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board

Dates: April 2018 – May 2019

Client: Pathway Innovations and Technologies, Inc. (patent owner)

Petitioners: AVer Information Inc. and iPEVO, Inc.

San Diego IP Law Group LLP

Technology: Document cameras and video processing

Deposed Sept. 20, 2018

In the Matter of Certain Digital Cable and Satellite Products, Set-Top Boxes, Gateways, and Components Thereof, Inv. No. 337-TA-1049

Court: U.S. International Trade Commission

Dates: July 2017 – Nov. 2017

Client: ARRIS International plc; ARRIS Group, Inc.; ARRIS Technology, Inc.; ARRIS Enterprises LLC; ARRIS Solutions, Inc.; ARRIS Global Ltd. (formerly Pace Ltd.); Pace Americas, LLC; Pace Americas Holdings, Inc.; Pace USA LLC; and Pace Americas Investments, LLC (resp.)

Complainant: Sony Corporation and Sony Electronics Inc.

Counsel: Fish and Richardson P.C.

Technology: Video receiver and video processing

Inter Partes Review of Patent No. 7,720,294

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board

Dates: June 2017 – Sept. 2017

Client: Broadcom Corp. (patent owner)

Petitioner: Advanced Micro Devices, Inc.

Counsel: Swanson & Bratschun, LLC

Technology: Video decoding

Inter Partes Review of Patent No. 7,472,151

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: June 2017 – Sept. 2017
Client: Broadcom Corp. (patent owner)
Petitioner: Advanced Micro Devices, Inc.
Counsel: Swanson & Bratschun, LLC
Technology: Video decoding

In the Matter of Certain Document Cameras and Software for Use Therewith, Inv. No. 337-TA-1045

Court: U.S. International Trade Commission
Dates: May 2017 – Nov. 2017
Client: Pathway Innovations and Technologies, Inc. (compl.)
Respondents: iPEVO, Inc. AVer Information, Inc. and Lumens Integration, Inc.
Counsel: San Diego IP Law Group LLP
Technology: Document cameras and video processing
Deposed Oct. 2017

Inter Partes Review of Patent No. 8,032,919

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: May 2017 – Nov. 2017
Client: ARRIS International plc, ARRIS Group, Inc., ARRIS Technology, Inc., ARRIS Enterprises, LLC, ARRIS Solutions, Inc., ARRIS Global Ltd. and ARRIS U.S. Holdings, Inc. (pet.)
Patent owner: Sony Corporation
Counsel: Fish & Richardson
Technology: Video receiver and video processing

Inter Partes Review of Patent No. 6,467,093

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: May 2017 – Nov. 2017
Client: ARRIS International plc, ARRIS Group, Inc., ARRIS Technology, Inc., ARRIS Enterprises, LLC, ARRIS Solutions, Inc., ARRIS Global Ltd. and ARRIS U.S. Holdings, Inc. (pet.)
Patent owner: Sony Corporation
Counsel: Fish & Richardson
Technology: Video receiver and video processing

Sony Corporation v. ARRIS Global Ltd. and Pace Americas, LLC
(formerly *Sony Corporation v. Pace plc and Pace Americas, LLC*)

Court: U.S. District Court for the District of Delaware
Dates: March 2017 – Nov. 2017
Client: Pace plc and Pace Americas, LLC (bought by ARRIS Group) (def.)
Counsel: Fish & Richardson
Technology: Video communication and encryption

Inter Partes Review of Patent No. 8,147,332

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: March 2017 – June 2017
Client: Broadcom Corp. (patent owner)
Petitioner: Sony Corporation
Counsel: Swanson & Bratschun, LLC
Technology: Video game systems

Broadcom Corp. et al. v. Sony Corp. et al., Case No. 16-cv-1052-JVS-JCG

Court: U.S. District Court for the Central District of California, Santa Ana Division
Dates: Feb. 2016 – June 2017
Client: Broadcom Limited (pl.)
Counsel: Thompson & Knight LLP
Technology: Video processing systems, video game systems

Reckitt Benckiser LLC v. Amneal Pharmaceuticals LLC, et al., Civil Action No. 15-2155
(RMB)(JS)(Consolidated)

Court: U.S. District Court for the District of New Jersey
Dates: March 2017 – May 2017
Client: Dr. Reddy's Laboratories (def.)
Counsel: Budd Larner P.C.
Technology: Image analysis of pharmaceutical tablets
Deposed May 2017
Testified at trial, May 2017

eWatch v. Apple, Inc., et al., Case No. 2:13-cv-01061

Court: U.S. District Court for the Eastern District of Texas
Dates: Nov. 2016 – Jan. 2017
Client: ZTE (USA), Inc. (def.)
Counsel: Pillsbury Winthrop Shaw Pittman LLP
Technology: Cellular camera phones, image transmission over wireless network

Inter Partes Review of Patent No. 7,085,123

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: Mar. 2016 – Dec. 2016
Client: Mazda Motor Corp. (pet.)
Patent owner: Power Regeneration LLC
Counsel: DLA Piper LLP
Technology: Power supply circuits

Inter Partes Review of Patent No. 7,558,472

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: Jun. 2016 – Nov. 2016
Client: Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (pet.)
Patent owner: TiVo Inc.
Counsel: Fish & Richardson P.C.
Technology: Video processing hardware and software

Inter Partes Review of Patent No. 8,457,476

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: Jun. 2016 – Nov. 2016
Client: Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (pet.)
Patent owner: TiVo Inc.
Counsel: Fish & Richardson P.C.
Technology: Video processing hardware and software

Saint Lawrence Communications LLC v. HTC Corporation and HTC America, Inc., Case No. 2:15-cv-00919

Court: U.S. District Court, Eastern District of Texas, Marshall Division

Dates: Apr. 2016 – Nov. 2016

Client: HTC Corporation and HTC America, Inc. (def.)

Counsel: Cooley LLP

Technology: Speech and audio compression

In the Matter of Certain Computing or Graphics Systems, Components Thereof, and Vehicles Containing Same, ITC Inv. No. 337-TA-984

Court: U.S. International Trade Commission

Dates: Feb. 2016 – Nov. 2016

Client: Bayerische Motoren Werke AG, BMW of North America, LLC, BMW Manufacturing Co., LLC, Renesas Electronics Corporation, and Renesas Electronics America Inc. (resp.)

Complainant: Advanced Silicon Technologies Inc.

Counsel: DLA Piper LLP (for BMW), Foley & Lardner LLP (for Renesas)

Technology: Memory controllers for data processing systems

TiVo Inc. v. Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC

Court: U.S. District Court for the Eastern District of Texas, Marshall Division

Dates: Dec. 2015 – Mar. 2016

Client: Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (def.)

Counsel: Fish & Richardson

Technology: Video processing hardware and software

Civolution B.V. v. Doremi Labs, Inc., No. 2:14-CV-00962-JAK-RZ

Court: U.S. District Court, Central District of California, Western Division

Dates: Dec. 2014 – Jan. 2016

Client: Doremi Labs, Inc. (def.)

Counsel: Gibson, Dunn & Crutcher LLP

Technology: Video watermarking to detect cinematic copies

Deposed May 2015

e-Watch, Inc. et al. v. LG Electronics et al., No. 2:13-cv-01064

Court: U.S. District Court, Eastern District of Texas, Marshall Division

Dates: Feb. 2015 – Oct. 2015

Client: LG Electronics, Inc., LG Electronics U.S.A., Inc., LG Electronics Mobilecomm U.S.A., Inc. (def.)

Counsel: Fish & Richardson P.C.

Technology: Cellular camera phone, image transmission over wireless network

Invensys Systems, Inc. v. Emerson Electric Co. and Micro Motion Inc. USA, No. 6:12-cv-00799-LED

Court: U.S. District Court, Eastern District of Texas, Tyler Division

Dates: Jan. 2014 – Apr. 2015

Client: Invensys Systems, Inc. (pl. and counter-claim def.)

Counsel: DLA Piper LLP

Technology: Digital controllers for digital flow meters

Deposed Nov. 2014

Inter Partes Review of Patent No. 7,103,380

Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board

Dates: Sept. 2013 – Dec. 2014

Client: Apple Inc. (pet.)

Patent owner: NetAirus Technologies LLC

Counsel: Sterne, Kessler, Goldstein & Fox

Technology: Wireless communication (cellular and Wi-Fi)

NetAirus Technologies, LLC v. Apple Inc., No. 10-CV-03257-JAK

Court: U.S. District Court, Central District of California

Dates: June 2011 – Dec. 2014

Client: Apple Inc. (def.)

Counsel: Milbank, Tweed, Hadley, & McCloy LLP

Technology: Wireless communication (cellular and Wi-Fi)

Deposed Aug. 2013

Testified and cross-examined at jury trial, Nov. 2013

Jury verdict: no infringement by Apple; NetAirus patent claims are invalid

Affirmed by U.S. Court of Appeals for the Federal Circuit, Dec. 2014

Motorola Mobility, Inc. et al. v. TiVo Inc., No. 5:11-cv-00053-MHS-CMC

Court: U.S. District Court, Eastern District of Texas, Texarkana Division

Dates: Sept. 2012 – June 2013

Client: Motorola Mobility, Inc., General Instrument Corp., Time Warner Cable, Inc. and Time Warner Cable LLC (counter-claim def.)

Counsel: DLA Piper LLP; Quinn Emanuel Urquhart & Sullivan, LLP

Technology: Video processing hardware and software

Deposed April 2013

MedioStream, Inc. v. Microsoft Corporation et al., No. 5:11-CV-2525; transferred from Texas case

MedioStream, Inc. v. Microsoft Corporation et al., No. 2:08-CV-369-CE; merged from *MedioStream, Inc. v. Acer America Corp. et al.*, No. 2:07-CV-376-CE

Court: U.S. District Court, Northern District of California, San Jose Division, transferred from Eastern District of Texas, Marshall Division

Dates: Aug. 2010 – March 2013

Client: Apple Inc. (def.)

Counsel: Milbank, Tweed, Hadley, & McCloy LLP

Technology: Video compression, video format conversion, transcoding

TASER International, Inc. Re-Issue Application

Court: U.S. Patent and Trademark Office

Dates: Feb. 2013

Client: TASER International, Inc. (pet'r)

Technology: Electric circuits for stun guns

TASER International, Inc. v. Stinger Systems, Inc.; James F. McNulty, Jr.; and Robert Gruder, No. 2:09-CV-00289-KJD-PAL

Court: U.S. District Court, District of Nevada

Dates: July 2011 – Sept. 2012

Client: TASER International, Inc. (pl.)

Counsel: Perkins Coie LLP

Technology: Electric circuits for stun guns

LSI Corporation v. Vizio, Inc., No. SACV10-01602 AG AJW

Court: U.S. District Court for the Central District of California

Dates: July 2011 – June 2012

Client: LSI Corporation (pl.)

Counsel: Thompson & Knight LLP

Technology: Digital video coding (MPEG) hardware & software

TASER International, Inc. v. Stinger Systems, Inc., No. CV07-0042-PHX-MHM/JHT; also *Motion for Contempt against Karbon Arms LLC and Robert Gruder*

Court: U.S. District Court, District of Arizona

Dates: Aug. 2007 – Jan. 2012

Client: TASER International, Inc. (pl.)

Counsel: Perkins Coie LLP

Technology: Electric circuits for stun guns

Testified and cross-examined at Markman hearing, May 2008

Deposed Nov. 2011

Testified and cross-examined at contempt hearing, Dec. 2011

SanDisk Corp. v. LSI Corp. et al., No. C-09-02727-WHA

Court: U.S. District Court, Northern District of California

Dates: Nov. 2009 – March 2010

Client: LSI Corp. (pl.)

Counsel: Thompson & Knight LLP

Technology: MPEG video and audio data compression

Trover Group, Inc., and Security Center, Inc. v. Diebold, Incorporated, No. 2:06-cv-00445-TJW

Court: U.S. District Court, Eastern District of Texas, Marshall Division

Dates: Oct. 2008 – April 2009

Client: Diebold, Inc. (def.)

Counsel: Thompson & Knight LLP

Technology: Image and video compression, storage, and retrieval in video security/surveillance systems

In Re: Katz Interactive Call Processing Patent Litigation, No. 07-ML-01816 FGK (FFMx) (*Ronald A. Katz Technology Licensing, LP v. American Airlines et al.*, No. CV 07-2196 RGK (FFMx))

Court: U.S. District Court, Central District of California

Dates: Feb. 2008 – May 2008

Client: National Railroad Passenger Corp. (d/b/a Amtrak) (def.)

Counsel: Steptoe & Johnson LLP

Technology: Telephone interface using voice prompts to collect data from caller

TASER International, Inc. v. Thomas G. Watkins III and Jane Doe Watkins, husband and wife, No. CV2005-002509

Court: Superior Court of Arizona, Maricopa County

Dates: May 2006 – Spring 2007

Client: TASER International, Inc. (pl.)

Counsel: Perkins Coie LLP

Technology: Electric circuits for stun guns

Vision BioSystems (USA) Trading, Inc. v. Ventana Medical Systems, Inc., No. 03-CV-10391-GAO; *Ventana Medical Systems, Inc. v. Vision BioSystems, Inc.*, No. 05-CV-10614-GAO

Court: U.S. District Court, District of Massachusetts

Dates: Sept. 2005 – May 2007

Client: Ventana Medical Systems, Inc. (pl.)

Counsel: Wilson Sonsini Goodrich & Rosati

Technology: Instrumentation for automated immunostaining

Forgent Networks, Inc. v. Echostar Technologies Corp. et al., No. 2-05CV-318-LED, transferred to No. 6:06-CV-208-LED

Court: U.S. District Court, Eastern District of Texas, Marshall Division, transferred to Tyler Division

Dates: May 2006 – May 2007

Client: Digeo, Inc. (def.)

Counsel: Perkins Coie LLP

Joint Counsel: Morrison Foerster; Dewey Ballantine LLP; Jones Day

Technology: Video processing systems

Deposed March 2007

Ventana Medical Systems, Inc. v. Biogenex Laboratories, Inc., No. CIV 03-92 TUC RCC

Court: U.S. District Court, District of Arizona

Dates: Aug. 2004 – May 2007

Client: Ventana Medical Systems, Inc. (pl.)

Counsel: Wilson Sonsini Goodrich & Rosati

Technology: Instrumentation for automated immunostaining

Deposed June 2005

Ventana Medical Systems, Inc. v. DakoCytomation California, Inc., No. CIV 04-1522-GMS

Court: U.S. District Court, District of Delaware

Dates: Sept. 2005

Client: Ventana Medical Systems, Inc. (pl.)

Counsel: Wilson Sonsini Goodrich & Rosati

Technology: Instrumentation for automated immunostaining

Kyocera International, Inc. v. Nokia, Inc., No. 04-CV-1992W-JFS

Court: U.S. District Court, Southern District of California

Dates: July 2005 – Aug. 2005

Client: Nokia, Inc. (def.)

Counsel: Jones Day

Technology: Cellular camera phone communications

Active Recognition Technologies, Inc.

Dates: Oct. 2003

Technology: Image processing for automated license plate recognition

Aerotech Laboratories, Inc.

Dates: April 2000

Technology: Image processing for automated recognition of fungal spores

Honors, Awards, and Memberships

Senior Member, Institute of Electrical and Electronics Engineers, IEEE Signal Processing Society

Best Poster Award. Douglas W. Todd, Rohit C. Philip, Maki Niihori, Jeffrey J. Rodriguez, and Abraham Jacob, "High-Throughput Behavioral Zebrafish Assay for Drug Development Targeting Hearing Loss", AOS 149th Annual Meeting, American Otological Society, May 20-21, 2016, Chicago, IL.

Best Paper Award. Abhinav K. Jha, Matthew A. Kupinski, Jeffrey J. Rodriguez, Renu M. Stephen, and Alison T. Stopeck, "Evaluating Segmentation Algorithms for Diffusion-Weighted MR Images: A Task-Based Approach," in *Image Perception, Observer Performance, and Technology Assessment*, David J. Manning and Craig K. Abbey, Eds., Proc. of SPIE, vol. 7627, pp. 76270L-1 to 76270L-8. Presented at SPIE Medical Imaging 2010, San Diego, CA, Feb. 13–18, 2010.

IEEE/HKN Outstanding Teaching Award, 1992

Andersen Consulting Outstanding Faculty Award, 1992

Honor societies: Eta Kappa Nu, Tau Beta Pi, Phi Kappa Phi, Sigma Xi

National Science Foundation Graduate Fellowship, 1985–1988

Teaching Experience

Courses taught in the Dept. of Electrical and Computer Engineering and the College of Optical Sciences:

- Digital Image Analysis (ECE/OPTI 532)
- Digital Image Processing (ECE/OPTI 533)
- Digital Signal Processing (ECE 429/529)
- Advanced Digital Signal Processing (ECE 528)
- Signals and Systems (ECE 340)
- Electric Circuits (ECE 320A)

University Service Activities

- Dept. of ECE Graduate Studies Committee, 2019-present
- Dept. of ECE Graduate Recruiting and Awards Committee, 2001–2003, 2005–2018
- Director of ECE Graduate Studies and Chair of the Dept. of ECE Graduate Studies Committee, 2000–2003, 2005–2016
- Dept. of ECE Executive Committee, 2001–2003, 2005–2016
- Dept. of ECE Annual Performance Review Committee, Spring 2015
- Dept. of ECE Committee on Committees, 2013-2016
- Chair, Dept. of ECE Faculty Search Committee, 2013
- BME Faculty Search Committee, 2008
- Search Committee for the Dean of the Eller College of Business and Public Administration, 2003–2004
- Dept. of ECE Graduate Studies Committee, 2003–2004
- Chair, College of Engineering Graduate Studies Committee, 2001–2003
- Co-Chair, Dept. of ECE Student/Faculty Interaction Committee, 2001–2002
- Dept. of ECE Undergraduate Mentoring Committee, 2001–2002
- College of Engineering Advisory Committee, 1998–2002
- Faculty co-advisor for Eta Kappa Nu chapter(electrical engineering honor society), 1994–2002

- Chair, Dept. of ECE Instructional Equipment and Software Planning Committee, 1998–2001
- Faculty Co-Advisor, Dept. of ECE Graduate Student Activities Committee (GSAC), 1995–2000
- Dept. of ECE Teaching Load Committee, Fall 2000
- Dept. of ECE Annual Performance Review Committee, Fall 2000
- Dept. of ECE Graduate Studies Committee, Fall 1997
- Search Committee for Head of Dept. of ECE, 1996–1997
- Dept. of ECE Computer Policy Committee, 1994–1997
- Dept. of ECE Student Recruiting Committee, 1995–1996
- Small Grants Peer Review Panel, U.A. Office of Vice President for Research, April 1993
- Dept. of ECE Subcommittee on Computer Programming Curriculum, 1992
- Dept. of ECE Seminar Series Committee, 1991–1992

Professional Service Activities

Panelist, NSF Panel, Division of Computing and Communication Foundations (CISE/CCF), 2020

Treasurer, 2020 IEEE Southwest Symp. on Image Analysis and Interpretation

Treasurer, 2018 IEEE Southwest Symp. on Image Analysis and Interpretation

Technical Program Committee, 2018 IEEE Southwest Symp. on Image Analysis and Interpretation

Session Chair, 2016 IEEE Intl. Conf. on Image Processing

Technical Program Committee, 2016 IEEE Intl. Conf. on Image Processing

General Chair, 2016 IEEE Southwest Symp. on Image Analysis and Interpretation

Chair, Steering Committee, IEEE Southwest Symp. on Image Analysis and Interpretation, 2007–present

Technical Program Committee, 2014 IEEE Intl. Conf. on Image Processing

General Chair, 2014 IEEE Southwest Symp. on Image Analysis and Interpretation

Reviewer, 2013 IEEE Intl. Conf. on Image Processing

Finance Chair, 2012 IEEE Southwest Symp. on Image Analysis and Interpretation

Reviewer, 2012 IEEE Intl. Conf. on Image Processing

Program Committee, 2012 IEEE Southwest Symp. on Image Analysis and Interpretation

Finance Chair, 2010 IEEE Southwest Symp. on Image Analysis and Interpretation

Program Committee, 2010 IEEE Southwest Symp. on Image Analysis and Interpretation

Reviewer, 2010 IEEE Intl. Conf. on Image Processing

Reviewer, 2010 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing

Awards Subcommittee, IEEE Signal Processing Society Technical Committee on Image, Video, and Multidimensional Signal Processing (IVMSP), 2008–2010

Program Committee, 2009 IASTED Intl. Conf. on Signal Processing, Pattern Recognition and Applications (SPPRA)

IEEE Signal Processing Society Technical Committee on Image, Video, and Multidimensional Signal Processing (IVMSP), 2005–2011

Reviewer, 2008 IEEE Intl. Conf. on Image Processing

Program Committee, 2008 IEEE Southwest Symp. on Image Analysis and Interpretation

Member, IEEE Signal Processing Society Technical Directions Board, 2007

IEEE Signal Processing Conference Board, 2006–2008
 Reviewer, NSF Industry/University Cooperative Research Program, 2007
 General Chair, 2007 IEEE Intl. Conf. on Image Processing
 Program Committee, 2006 IEEE Intl. Conf. on Image Processing
 Program Committee, 2006 IEEE Southwest Symp. on Image Analysis and Interpretation
 Program Committee, 2005 IEEE Intl. Conf. on Image Processing
 Reviewer, 2005 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing
 Vice Chair, 2004 IEEE Southwest Symp. on Image Analysis and Interpretation
 Program Committee, 2004 IEEE Intl. Conf. on Image Processing
 Special Editor, Integrated Computer-Aided Engineering, 2003–2004
 General Chair, 2003 IEEE Southwest Symp. on Mixed-Signal Design
 Program Committee, 2003 IEEE Intl. Conf. on Image Processing
 Program Committee, 2002 IEEE Intl. Conf. on Image Processing
 Program Committee, 2002 Southwest Symp. on Image Analysis and Interpretation
 Organizing Committee, 2002 IEEE Intl. Symp. on Circuits and Systems
 Reviewer, 2002 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing
 Program Committee, 2001 IEEE Intl. Conf. on Image Processing
 Organizing Committee, 2001 Southwest Symp. on Mixed-Signal Design
 Associate Editor, IEEE Trans. on Image Processing, 1996–2000
 Vice Chair, 2000 IEEE Southwest Symp. on Image Analysis and Interpretation
 Reviewer, 2000 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing
 Program Committee, 2000 Intl. Conf. on Pattern Recognition
 Organizing Committee, 2000 Southwest Symp. on Mixed-Signal Design
 Publications Chair, 1999 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing
 Organizing Committee, 1999 Southwest Symp. on Mixed-Signal Design
 Program Committee, 1999 IEEE Intl. Conf. on Image Processing
 Area Program Chair, 1999 IEEE-CS Conf. on Computer Vision and Pattern Recognition
 General Chair, 1998 IEEE Southwest Symp. on Image Analysis and Interpretation
 Program Committee, 1998 IEEE Intl. Conf. on Image Processing
 Program Committee, Area Coordinator, 1997 IEEE Intl. Conf. on Image Processing
 Organizing Committee, 1997 IEEE Intl. Performance, Computing, and Communications Conf.
 National Science Foundation Reviewer for BIR Division, Sept. 1996
 Program Committee, 1996 IEEE Intl Conf. on Image Processing
 Program Chair, 1996 IEEE Southwest Symp. on Image Analysis and Interpretation
 Organizing Committee, 1996 IEEE Intl. Phoenix Conf. on Computers and Communication
 Program Committee, 1995 SPIE Intl. Symp. on Optics, Imaging, and Instrumentation: Applications of Digital
 Image Processing XVIII
 Organizing Committee, 1995 IEEE Intl. Phoenix Conf. on Computers and Communication
 Program Committee, 1995 IEEE Intl. Phoenix Conf. on Computers and Communication

Session Chair, 1994 SPIE Intl. Symp. on Optics, Imaging, and Instrumentation: Applications of Digital Image Processing XVII

Program Committee, 1994 IEEE Intl. Phoenix Conf. on Computers and Communication

National Science Foundation Review Panelist for DUE Division, Washington, D.C., Feb. 1993

Program Committee, 1993 IEEE Intl. Phoenix Conf. on Computers and Communication

Technical reviewer for numerous technical conferences, journals, and book publishers

Completed Theses and Dissertations Supervised

Rohit Chacko Philip, Ph.D., May 2020, *Generalized Performance Measures for Evaluation of Object Detection*.

Sree Ramya Surya Prabha Malladi, Ph.D., Aug. 2019, *Superpixel Segmentation Systems: Design and Analysis*.

Ramaprasad Kulkarni, Ph.D., May 2018, *Image Segmentation and Analysis Methods and Their Evaluation on Synthesized Porous Media Data*.

Ding Ding, Ph.D., Aug. 2017, *Image Inpainting Based on Exemplars and Sparse Representation*.

Sundaresh Ram, Ph.D., Aug. 2017, *Sparse Representations and Nonlinear Image Processing for Inverse Imaging Solutions*.

Xin Gao, M.S., Dec. 2016, *Automatic Detection, Segmentation and Tracking of Vehicles in Wide-Area Aerial Imagery*.

Mohammed Alfowzan, Ph.D., Dec. 2016, *Solutions to Space-Time Inverse Problems*.

Douglas W. Todd, M.S., Aug. 2016, *Zebrafish Video Analysis System for High-Throughput Drug Assay*.

José A. Rosado-Toro, Ph.D., May 2016, *Right Ventricle Segmentation Using Cardiac Magnetic Resonance Images*.

Basel Salahieh, Ph.D., Dec. 2015, *Computational Imaging for Miniature Cameras*.

Jianbo Shao, M.S., Aug. 2015, *Analysis and Processing of Primary Cilia in Microscopy Images*.

Vijai T. Jayadevan, M.S., Dec. 2013, *Forecasting Solar Power Intermittency Using Ground-Based Sky Imaging*.

Sundaresh Ram, M.S., Dec. 2010, *3-D Fluorescent Spot Segmentation in Confocal Microscopic Images*.

Abhinav Kumar Jha, M.S., Aug. 2009, *ADC Estimation in Diffusion-Weighted Images*.

Rohit Chacko Philip, M.S., Dec. 2008, *Seed Pruning for Multi-Resolution Segmentation of Vasculature in Immunohistochemical Images*.

Sivaramakrishnan Rajaraman, M.S., Dec. 2008, *Automated Registration of Breath-Hold DCE-MRI Images of Human Volunteers in Cancer Clinical Trials*.

Naren Vijayakumar, M.S., Dec. 2008, *Multimodality Image Registration Using Gradient Information and Clustering*.

Sunil Seepuri, M.S., Aug. 2008, *An Integrated Tool for 3-D Segmentation of Internal Hemoglobin in TEM Images*.

Santosh V. Chapaneri, M.S., Aug. 2008, *Content-Adaptive Improved Error Concealment Methods for H.264/AVC Video Communication*.

Narasimhan Rajagopalan, M.S., May 2008, *An Integrated Technique for Segmentation and Volume Estimation in Spots in 3-D Human Cell Cultures Using Watersnakes*.

- Mehul Patel, M.S., May 2008, *Image Analysis Algorithms for Ovarian Cancer Detection Using Confocal Microendoscopy*.
- Luca Caucci, M.S., May 2007, *Point Detection and Hotelling Discriminant: An Application in Adaptive Optics*.
- Mingkuan Liu, Ph.D., Dec. 2006, *QoS Improvement Schemes for Real-Time Wireless VoIP*.
- Natalia Gaviria Gomez, Ph.D., Aug. 2006, *Genetic Algorithms for Optimization of Wireless Devices*.
- Diljith M. Thodi, M.S., Aug. 2005, *Techniques to Improve the Performance of Expansion-Embedding-Based Reversible Watermarking Algorithms*.
- Neema K. Shetty, M.S., Aug. 2005, *Improving Image Fidelity of Equalized Spectrum Watermarking Scheme Using Perceptual Modeling*.
- Nikhil S. Rajguru, M.S., Aug. 2005, *A Level-Set Approach to 3-D Segmentation of Lesions from T1-Weighted Spin-Echo DCE-MR Images*.
- Vivek Shankar, M.S., May 2005, *Texture-Based Automated Lithological Classification Using Aeromagnetic Anomaly Images*.
- Saurabh Srivastava, M.S., Dec. 2004, *Computer-Aided Identification of Ovarian Cancer in Confocal Microendoscope Images*.
- Mary L. Cassabaum, Ph.D., Aug. 2004, *Exploiting High Dimensional Data for Signal Characterization and Classification in Feature Space*.
- Ranjini T. Rajeevan, M.S., Aug. 2004, *Automated Segmentation of Lesions in Magnetic Resonance Images of the Brain*.
- Chetankumar Krishnamurty, M.S., Aug. 2004, *Automated Lesion Segmentation and Tracking in Echo-Planar Diffusion-Weighted Liver MRI*.
- Siddharth Mathur, M.S., Dec. 2003, *Variable-Length Vocal-Tract Modeling for Speech Synthesis*.
- Victor Gajendran, M.S., Dec. 2003, *Towards a Completely Automated Chromosome Counting System*.
- Amarpreet S. Chawla, M.S. Aug. 2003, *Analysis of Image Quality of Medical Imaging Displays*.
- Sundararajan Sankaranarayanan, M.S., August 2003, *Design and Analysis of an Improved Data Acquisition System for Digital Flow Cytometry*.
- Bo Xia, M.S., May 2002, *An Improved Digital System Design for Flow Cytometric Analysis*.
- Phillip A. Mlsna, Ph.D., May 2001, *Color Sets with Morphological and B-Spline Enhancements for Content-Based Image Retrieval*.
- Te-shen Liang, Ph.D., May 2000, *Methods for Improved Robustness of Image Watermarking Algorithms*.
- Bruce A. Thomas, Ph.D., Dec. 1999, *New Aspects of Digital Color Image Enhancement*.
- David E. Hoyer, M.S., May 1996, *Performance Analysis of Vector and Scalar Median Filtering*.
- Qiang Zhang, M.S., May 1996, *A Recursive Technique for 3-D Histogram Enhancement of Color Images*.
- Te-shen "Dickson" Liang, M.S., Aug. 1995, *Segmentation of MR Cranial Images Using Mathematical Morphology and Fuzzy Clustering*.
- Mahesh Godavarti, M.S., Aug. 1995, *Digital Signal Processing and Neural Networks in Flow Cytometry*.
- Troy A. Berchem, M.S., May 1995, *A Digital Reconstruction System for Real-Time Magnetic Resonance Imaging*.
- Richard P. Mackey, M.S., May 1995, *An Asynchronous, Single-Chip, LMS Based, Adaptive Echo Canceller*.
- Jesse C. Ma, M.S., Dec. 1994, *Segmentation of 3-D MR Images Using the Fuzzy C-Means Algorithm and a Neural Network*.

Nick A. Zilmer, M.S., May 1994, *Analysis of the Use of Digital Signal Processing in Flow Cytometry*.
 James L. Lee, M.S., Dec. 1993, *Automated Segmentation of Magnetic Resonance Images of the Brain*.
 Phillip A. Mlsna, M.S., Dec. 1992, *Color Image Enhancement by Three-Dimensional Histogram Modification*.
 Christopher C. (Chuen-Chi) Yang, M.S., Dec. 1992, *Effects of Coordinate Systems on Color Image Processing*.

Peer-Reviewed Journal Papers

Note: "doi:" = "http://doi.org/".

- [1] Mohammad S. Majdi, Bryan Kromenacker, Robert C. Wilson, Christina Staroshak, Jeffrey J. Rodriguez, Esther Sternberg, J. Ray Runyon, and Jacob N. Hyde, "Thermographic imaging for detection of changes in autonomic nervous system activity and response to varying stress levels through changes in sweat pore activation," *PLOS ONE*, submitted.
- [2] Sree Ramya S. P. Malladi, Sundaresh Ram, and Jeffrey J. Rodriguez, "Evaluation of Under-Segmentation Metrics Used for Superpixel Segmentation Quality Assessment," *IEEE Trans. on Pattern Analysis and Machine Intelligence*, submitted.
- [3] Sundaresh Ram and Jeffrey J. Rodriguez, "Robust Segmentation of Cell Nuclei in 3-D Microscopy Images," *IEEE Trans. on Image Processing*, submitted.
- [4] Sree Ramya S. P. Malladi, Sundaresh Ram, and Jeffrey J. Rodriguez, "Image Denoising Using Superpixel-Based PCA," *IEEE Trans. on Multimedia*, accepted for publication.
- [5] Mohammad S. Majdi, Mahesh B. Keerthivasan, Brian K. Rutt, Natalie M. Zahr, Jeffrey J. Rodriguez, and Manojkumar Saranathan, "Automated Thalamic Nuclei Segmentation Using Multi-Planar Cascaded Convolutional Neural Networks," *Magnetic Resonance Imaging*, vol. 73, Nov. 2020, pp. 45-54, doi: 10.1016/j.mri.2020.08.005.
- [6] Xin Gao, Sundaresh Ram, and Jeffrey J. Rodriguez, "Correction to: A Post-Processing Scheme for the Performance Improvement of Vehicle Detection in Wide-Area Aerial Imagery," *Signal, Image and Video Processing*, vol. 14, no. 3, April 2020, p. 635, doi:10.1007/s11760-020-01667-7.
- [7] Xin Gao, Sundaresh Ram, and Jeffrey J. Rodriguez, "A Post-Processing Scheme for the Performance Improvement of Vehicle Detection in Wide-Area Aerial Imagery," *Signal, Image and Video Processing*, vol. 14, no. 3, April 2020, pp. 625-633, doi:10.1007/s11760-019-01592-4.
- [8] Ding Ding, Sundaresh Ram, and Jeffrey J. Rodriguez, "Perceptually Aware Image Inpainting," *Pattern Recognition*, vol. 83, Nov. 2018, pp. 174-184, doi: 10.1016/j.patcog.2018.05.025.
- [9] Rodrigo Savage, Jeffrey J. Rodriguez, Leon Palafox, Clayton T. Morrison, Kobus Barnard, and Shane Byrne, "A Bayesian Approach to Automatic Crater Shape Analysis from a Single HiRISE Image," *IEEE Trans. on Geoscience and Remote Sensing*, vol. 56, no. 10, Oct. 2018, pp. 5802-5812, doi:10.1109/TGRS.2018.2825608.
- [10] Ding Ding, Sundaresh Ram, and Jeffrey J. Rodriguez, "Image Inpainting Using Nonlocal Texture Matching and Nonlinear Filtering," *IEEE Trans. on Image Processing*, vol. 28, no. 4, April 2019, pp. 1705-1719, doi:10.1109/TIP.2018.2880681.
- [11] Bofan Song, Sumsum Sunny, Ross D. Uthoff, Sanjana Patrick, Amritha Suresh, Trupti Kolar, G. Keerthi, Afarin Anbarani, Petra Wilder-Smith, Moni Abraham Kuriakose, Praveen Birur, Jeffrey J. Rodriguez, and Rongguang Liang, "Automatic Classification of Dual-Modality, Smartphone-Based Oral Dysplasia and Malignancy Images Using Deep Learning," *Biomedical Optics Express*, vol. 9, no. 11, Nov. 2018, pp. 5318-5329, doi:10.1364/BOE.9.005318.
- [12] Rohit C. Philip, Jeffrey J. Rodriguez, Maki Niihori, Ross H. Francis, Jordan A. Mudery, Justin S. Caskey, Elizabeth Krupinski, Abraham Jacob, "Automated High-Throughput Damage Scoring of Zebrafish

- Lateral Line Hair Cells After Ototoxin Exposure,” *Zebrafish*, vol. 15, no. 2, April 2018, pp. 145-155, doi:10.1089/zeb.2017.1451.
- [13] Sundaresh Ram, Forest Danford, Stephen Howerton, Jeffrey J. Rodriguez, and Jonathan P. Vande Geest, “Three-Dimensional Segmentation of the Ex-Vivo Anterior Lamina Cribrosa from Second-Harmonic Imaging Microscopy,” *IEEE Trans. on Biomedical Engineering*, vol. 65, no. 7, July 2018, pp. 1617-1629, doi:10.1109/TBME.2017.2674521.
- [14] Douglas W. Todd, Rohit C. Philip, Maki Niihori, Ryan A. Ringle, Kelsey R. Coyle, Sobia F. Zehri, Jordan A. Mudery, Ross H. Francis, Jeffrey J. Rodriguez, and Abraham Jacob, “A Fully Automated High-Throughput Zebrafish Behavioral Ototoxicity Assay,” *Zebrafish*, vol. 14, no. 4, Aug. 2017, pp. 331-342, doi:10.1089/zeb.2016.1412.
- [15] José A. Rosado-Toro, Aiden Abidov, María I. Altbach, Isabel B. Oliva, Jeffrey J. Rodríguez, and Ryan J. Avery, “Segmentation of the Right Ventricle in Four Chamber Cine Cardiac MR Images using Polar Dynamic Programming,” *Computerized Medical Imaging and Graphics*, vol. 62, Dec. 2017, pp. 15-25, doi:10.1016/j.compmedimag.2017.08.002.
- [16] José A. Rosado-Toro, María I. Altbach, and Jeffrey J. Rodríguez, “Dynamic Programming Using Polar Variance for Image Segmentation,” *IEEE Trans. on Image Processing*, vol. 25, no. 12, Dec. 2016, pp. 5857-5866, doi:10.1109/TIP.2016.2615809.
- [17] Abhinav K. Jha, Jeffrey J. Rodriguez, and Alison T. Stopeck, “A Maximum-Likelihood Method to Estimate a Single ADC Value of Lesions Using Diffusion MRI,” *Magnetic Resonance in Medicine*, vol. 76, no. 6, Dec. 2016, pp. 1919-1931, doi:10.1002/mrm.26072.
- [18] Basel Salahieh, Jeffrey J. Rodriguez, Sean Stetson, and Rongguang Liang, “Single-Image Full-Focus Reconstruction Using Depth-Based Deconvolution,” *Optical Engineering*, vol. 56, no. 4, Sept. 30, 2016, pp. 041302-1 to 041302-10, doi:10.1117/1.OE.56.4.041302.
- [19] Sundaresh Ram and Jeffrey J. Rodriguez, “Size-Invariant Detection of Cell Nuclei in Microscopy Images,” *IEEE Trans. on Medical Imaging*, vol. 35, no. 7, July 2016, pp. 1753-1764, doi:10.1109/TMI.2016.2527740.
- [20] Shaun Pacheco, Basel Salahieh, Tom Milster, Jeffrey J. Rodriguez, and Rongguang Liang, “Transfer Function Analysis in Epi-Illumination Fourier Ptychography,” *Optics Letters*, vol. 40, no. 22, Nov. 15, 2015, pp. 5343-5346, doi:10.1364/OL.40.005343.
- [21] Basel Salahieh, Jeffrey J. Rodriguez, and Rongguang Liang, “Direct Superresolution for Realistic Image Reconstruction,” *Optics Express*, vol. 23, no. 20, Oct. 5, 2015, pp. 26124-26138, doi:10.1364/OE.23.026124.
- [22] Renu M. Stephen, Abhinav K. Jha, Denise J. Roe, Theodore P. Trouard, Jean-Philippe Galons, Matthew A. Kupinski, Georgette Frey, Haiyan Cui, Scott Squire, Mark D. Pagel, Jeffrey J. Rodriguez, Robert J. Gillies, and Alison T. Stopeck, “Diffusion MRI with Semi-Automated Segmentation Can Serve as a Restricted Predictive Biomarker of the Therapeutic Response of Liver Metastasis,” *Magnetic Resonance Imaging*, vol. 33, no. 10, Dec. 2015, pp. 1267-1273, doi:10.1016/j.mri.2015.08.006.
- [23] Vijai T. Jayadevan, Jeffrey J. Rodriguez, and Alexander D. Cronin, “A New Contrast Enhancing Feature for Cloud Detection in Ground-Based Sky Images,” *Journal of Atmospheric and Oceanic Technology*, vol. 32, no. 2, Feb. 2015, pp. 209-219, doi:10.1175/JTECH-D-14-00053.1.
- [24] José A. Rosado-Toro, Tomoe Barr, Jean-Phillipe Galons, Marilyn T. Marron, Alison Stopeck, Cynthia Thomson, Patricia Thompson, Danielle Carroll, Eszter Wolf, María Altbach, Jeffrey J. Rodríguez, “Automated Breast Segmentation of Fat and Water MR Images Using Dynamic Programming,” *Academic Radiology*, vol. 22, no. 2, Feb. 2015, pp. 139-148, doi:10.1016/j.acra.2014.09.015.
- [25] James L. Huang and Jeffrey J. Rodriguez, “Non-Rigid Registration Using Gradient of Self-Similarity Response,” *Image and Vision Computing*, vol. 32, no. 11, Nov. 2014, pp. 825-834, doi:10.1016/j.imavis.2014.06.005.

- [26] Basel Salahieh, Zhenyue Chen, Jeffrey J. Rodriguez, and Rongguang Liang, "Multi-Polarization Fringe Projection Imaging for High Dynamic Range Objects," *Optics Express*, vol. 22, no. 8, April 21, 2014, pp. 10064-10071, doi:10.1364/OE.22.010064.
- [27] Sivaramakrishnan Rajaraman, Jeffrey J. Rodriguez, and Natarajan Raghunand, "Response to Andrew Melbourne, 'Comment on: Automated Registration of Sequential Breath-Hold Dynamic Contrast-Enhanced MR Images: A Comparison of Three Techniques,'" *Magnetic Resonance Imaging*, vol. 31, no. 2, Feb. 2013, pp. 326-328, doi:10.1016/j.mri.2012.07.011.
- [28] Abhinav K. Jha, Matthew A. Kupinski, Jeffrey J. Rodriguez, Renu M. Stephen, and Alison T. Stopeck, "Corrigendum: Task-Based Evaluation of Segmentation Algorithms for Diffusion-Weighted MRI without Using a Gold Standard," *Physics in Medicine and Biology*, vol. 58, no. 1, Jan. 7, 2013, p. 183, doi:10.1088/0031-9155/58/1/183.
- [29] Jennifer M. Watson, Photini F. Rice, Samuel L. Marion, Molly A. Brewer, John R. Davis, Jeffrey J. Rodriguez, Urs Utzinger, Patricia B. Hoyer, and Jennifer K. Barton, "Analysis of Second-Harmonic Generation Microscopy in a Mouse Model of Ovarian Carcinoma," *Journal of Biomedical Optics*, vol. 17, no. 7, July 2012, pp. 076002-1 to 076002-9, doi:10.1117/1.JBO.17.7.076002.
- [30] Sundaresh Ram, Jeffrey J. Rodriguez, and Giovanni Bosco, "Segmentation and Detection of Fluorescent 3D Spots," *Cytometry: Part A*, vol. 81A, no. 3, March 2012, pp. 198-212, doi:10.1002/cyto.a.22017.
- [31] Abhinav K. Jha, Matthew A. Kupinski, Jeffrey J. Rodriguez, Renu M. Stephen, and Alison T. Stopeck, "Task-Based Evaluation of Segmentation Algorithms for Diffusion-Weighted MRI without Using a Gold Standard," *Physics in Medicine and Biology*, vol. 57, no. 13, 7 July 2012, pp. 4425-46, <http://iopscience.iop.org/article/10.1088/0031-9155/57/13/4425>.
- [32] Sivaramakrishnan Rajaraman, Jeffrey J. Rodriguez, Christian Graff, Maria I. Altbach, Tomislav Dragovich, Claude B. Sirlin, Ronald L. Korn, and Natarajan Raghunand, "Automated Registration of Sequential Breath-Hold Dynamic Contrast-Enhanced MR Images: A Comparison of Three Techniques," *Magnetic Resonance Imaging*, vol. 29, no. 5, June 2011, pp. 668-82, doi:10.1016/j.mri.2011.02.012.
- [33] Santosh V. Chapaneri and Jeffrey J. Rodriguez, "Content-Adaptive Temporal Error Concealment Scheme for H.264/AVC Video Communication," *ICGST Journal on Graphics, Vision and Image Processing (ICGST-GVIP)*, vol. 10, no. 2, June 2010, pp. 9-18.
- [34] Luca Caucci, Harrison H. Barrett, and Jeffrey J. Rodriguez, "Spatio-Temporal Hotelling Observer for Signal Detection from Image Sequences," *Optics Express*, vol. 17, no. 13, June 2009, pp. 10946-10958, doi:10.1364/OE.17.010946.
- [35] Natalia Gaviria Gomez, Jeffrey J. Rodriguez, Kathleen L. Melde, Kevin M. McNeill, "Design of Low-Sidelobe Linear Arrays with High Aperture Efficiency and Interference Nulls," *IEEE Antennas and Wireless Propagation Letters*, vol. 8, 2009, pp. 607-610, 10.1109/LAWP.2009.2018126.
- [36] Saurabh Srivastava, Jeffrey J. Rodriguez, Andrew R. Rouse, Molly A. Brewer, and Arthur F. Gmitro, "Computer-Aided Identification of Ovarian Cancer in Confocal Microendoscope Images," *Journal of Biomedical Optics*, vol. 13, no. 2, March/April 2008, pp. 024021.1-13, doi:10.1117/1.2907167.
- [37] Luca Caucci, Harrison H. Barrett, Nicholas Devaney, and Jeffrey J. Rodriguez, "Application of the Hotelling and Ideal Observers to Detection and Localization of Exoplanets," *Journal of the Optical Society of America A*, vol. 24, no. 12, Dec. 2007, pp. B13-B24, doi:10.1364/JOSAA.24.000B13.
- [38] Cynthia M. Smith, J. Cole Smith, Stuart K. Williams, Jeffrey J. Rodriguez, James B. Hoying, "Automatic Thresholding of Three-Dimensional Microvascular Structures from Confocal Microscopy Images," *Journal of Microscopy*, vol. 225 (Part 3), March 2007, pp. 244-57, doi:10.1111/j.1365-2818.2007.01739.x.

- [39] Diljith M. Thodi and Jeffrey J. Rodriguez, "Expansion Embedding Techniques for Reversible Watermarking," *IEEE Trans. on Image Processing*, vol. 16, no. 3, March 2007, pp. 721–30, doi:10.1109/TIP.2006.891046.
- [40] Siddharth Mathur, Brad H. Story, and Jeffrey J. Rodriguez, "Vocal-Tract Modeling: Fractional Elongation of Segment Lengths in a Waveguide Model with Half-Sample Delays," *IEEE Trans. on Audio, Speech and Language Processing*, vol. 14, no. 5, Sept. 2006, pp. 1754–1762, doi:10.1109/TSA.2005.858550.
- [41] Kirk W. Gossage, Cynthia M. Smith, Elizabeth M. Kanter, Lida P. Hariri, Alice L. Stone, Jeffrey J. Rodriguez, Stuart K. Williams, and Jennifer K. Barton, "Texture Analysis of Speckle in Optical Coherence Tomography Images of Tissue Phantoms," *Physics in Medicine and Biology*, vol. 51, no. 6, March 21, 2006, pp. 1563–1575, <http://hdl.handle.net/10150/290030>.
- [42] Amarpreet S. Chawla, Hans Roehrig, Jeffrey J. Rodriguez, and Jiahua Fan, "Determining the MTF of Medical Imaging Displays Using Edge Techniques," *Journal of Digital Imaging*, vol. 18, no. 4, Dec. 2005, pp. 296–310, doi:10.1007/s10278-005-6977-4.
- [43] Shiva Murthi, Sundararajan Sankaranarayanan, Bo Xia, Georgina M. Lambert, Jeffrey J. Rodriguez, and David W. Galbraith, "Performance Analysis of a Dual-Buffer Architecture for Digital Flow Cytometry," *Cytometry, Part A*, vol. 66A, no. 2, Aug. 2005, pp. 109–118, doi:10.1002/cyto.a.20156.
- [44] Rexford D. Newbould, David L. Irby, Jo Dale Carothers, Jeffrey J. Rodriguez, and W. Timothy Holman, "Mixed Signal Design Watermarking for IP Protection," *Integrated Computer-Aided Engineering*, vol. 10, no. 3, 2003, pp. 249–65, <http://content.iospress.com/articles/integrated-computer-aided-engineering/ica00151>.
- [45] Kirk W. Gossage, Tomasz S. Tkaczyk, Jeffrey J. Rodriguez, and Jennifer K. Barton, "Texture Analysis of Optical Coherence Tomography Images: Feasibility for Tissue Classification," *Journal of Biomedical Optics*, vol. 8, no. 3, July 2003, pp. 570–5, doi:10.1117/1.1577575.
- [46] Rexford D. Newbould, David L. Irby, Jo Dale Carothers, Jeffrey J. Rodriguez, and W. Timothy Holman, "Watermarking of ICs for IP Protection," *Electronics Letters*, vol. 38, no. 6, March 14, 2002, pp. 272–4, doi:10.1049/el:20020143.
- [47] Christopher C. Yang and Jeffrey J. Rodriguez, "Efficient Luminance and Saturation Processing Techniques for Color Images," *Journal of Visual Communication and Image Representation*, vol. 8, no. 3, Sept. 1997, pp. 263–77, doi:10.1006/jvci.1997.0342.
- [48] Mahesh Godavarti, Jeffrey J. Rodriguez, Timothy A. Yopp, Georgina M. Lambert, and David W. Galbraith, "Automated Particle Classification Based on Digital Acquisition and Analysis of Flow Cytometric Pulse Waveforms," *Cytometry*, vol. 24, no. 4, 1996, pp. 330–9, doi:10.1002/(SICI)1097-0320(19960801)24:4<330::AID-CYTO4>3.0.CO;2-J.
- [49] Richard P. Mackey, Jeffrey J. Rodriguez, Jo D. Carothers and Sarma B. K. Vrudhula, "Asynchronous VLSI Architecture for Adaptive Echo Cancellation," *Electronics Letters*, vol. 32, no. 8, April 11, 1996, pp. 710–1, doi:10.1049/el:19960509.
- [50] Jeffrey J. Rodriguez and Christopher C. Yang, "High-Resolution Histogram Modification of Color Images," *Graphical Models and Image Processing*, vol. 57, no. 5, Sept. 1995, pp. 432–40, doi:10.1006/gmip.1995.1037.
- [51] Nick A. Zilmer, Jeffrey J. Rodriguez, Timothy A. Yopp, Georgina M. Lambert, and David W. Galbraith, "Flow Cytometric Analysis Using Digital Signal Processing," *Cytometry*, vol. 20, June 1995, pp. 102–17, doi:10.1002/cyto.990200203.
- [52] Phillip A. Mlsna and Jeffrey J. Rodriguez, "A Multivariate Contrast Enhancement Technique for Multispectral Images," *IEEE Trans. on Geoscience and Remote Sensing*, vol. 33, no. 1, Jan. 1995, pp. 212–6, doi:10.1109/36.368207.

- [53] Jeffrey J. Rodriguez and C. C. Yang, "Effects of Luminance Quantization Error on Color Image Processing," *IEEE Trans. on Image Processing*, vol. 3, no. 6, Nov. 1994, pp. 850–4, doi:10.1109/83.336254.
- [54] Jeffrey J. Rodriguez and J. K. Aggarwal, "Matching Aerial Images to 3-D Terrain Maps," *IEEE Trans. on Pattern Analysis and Machine Intelligence*, vol. 12, no. 12, Dec. 1990, pp. 1138–49, doi:10.1109/34.62603.
- [55] Jeffrey J. Rodriguez and J. K. Aggarwal, "Stochastic Analysis of Stereo Quantization Error," *IEEE Trans. on Pattern Analysis and Machine Intelligence*, vol. 12, no. 5, May 1990, pp. 467–70, doi:10.1109/34.55106.
- [56] Jeffrey J. Rodriguez, "An Improved FFT Digit-Reversal Algorithm," *IEEE Trans. on Acoustics, Speech, and Signal Processing*, vol. 37, no. 8, Aug. 1989, pp. 1298–300, doi:10.1109/29.31281.

Peer-Reviewed Proceedings Publications

- [1] Mohammad S. Majdi, Khalil N. Salman, Michael F. Morris, Nirav C. Merchant, and Jeffrey J. Rodriguez, "Deep Learning Classification of Chest X-Ray Images," *2020 IEEE Southwest Symp. on Image Analysis and Interpretation*, Santa Fe, NM, March 2020, pp. 116–119.
- [2] Sundaresh Ram, Vicky T. Nguyen, Kristen H. Limesand, and Jeffrey J. Rodriguez, "Combined Detection and Segmentation of Cell Nuclei in Microscopy Images Using Deep Learning," *2020 IEEE Southwest Symp. on Image Analysis and Interpretation*, Santa Fe, NM, March 2020, pp. 26–29.
- [3] Mohammad S. Majdi, Sundaresh Ram, Jonathan T. Gill, and Jeffrey J. Rodriguez, "Drive-Net: Convolutional Network for Driver Distraction Detection," *2018 IEEE Southwest Symp. on Image Analysis and Interpretation*, Las Vegas, NV, April 2018, pp. 1–4, doi: 10.1109/SSIAI.2018.8470309.
- [4] Rohit C. Philip, Sree Ramya S. P. Malladi, Maki Hiihori, Abraham Jacob, and Jeffrey J. Rodriguez, "Performance of Supervised Classifiers for Damage Scoring of Zebrafish Neuromasts," *2018 IEEE Southwest Symp. on Image Analysis and Interpretation*, Las Vegas, NV, April 2018, pp. 113–116.
- [5] Sree Ramya S. P. Malladi, Sundaresh Ram, and Jeffrey J. Rodriguez, "A Ground-Truth Fusion Method for Image Segmentation Evaluation," *2018 IEEE Southwest Symp. on Image Analysis and Interpretation*, Las Vegas, NV, April 2018, pp. 137–140, doi: 10.1109/SSIAI.2018.8470317.
- [6] Sundaresh Ram, Mohammed S. Majdi, Jeffrey J. Rodriguez, Yang Gao, and Heddwen L. Brooks, "Classification of Primary Cilia in Microscopy Images Using Convolutional Neural Random Forests," *2018 IEEE Southwest Symp. on Image Analysis and Interpretation*, Las Vegas, NV, April 2018, pp. 89–92, doi: 10.1109/SSIAI.2018.8470320.
- [7] Sundaresh Ram and Jeffrey J. Rodriguez, "Vehicle Detection in Aerial Images Using Multiscale Structure Enhancement and Symmetry," *2016 IEEE Intl. Conf. on Image Processing*, Phoenix, AZ, Sept. 25–28, 2016, pp. 3817–21, doi:10.1109/ICIP.2016.7533074.
- [8] Sundaresh Ram and Jeffrey J. Rodriguez, "Image Super-Resolution Using Graph Regularized Block Sparse Representation," *2016 IEEE Southwest Symp. on Image Analysis and Interpretation*, Santa Fe, NM, March 6–8, 2016, pp. 69–72, doi:10.1109/SSIAI.2016.7459177.
- [9] Xin Gao, Sundaresh Ram, and Jeffrey J. Rodriguez, "A Performance Comparison of Automatic Detection Schemes in Wide-Area Aerial Imagery," *2016 IEEE Southwest Symp. on Image Analysis and Interpretation*, Santa Fe, NM, March 6–8, 2016, pp. 125–128, doi:10.1109/SSIAI.2016.7459191.
- [10] Basel Salahieh, Jeffrey J. Rodriguez, and Rongguang Liang, "Direct Superresolution Technique for Solving a Miniature Multi-Shift Imaging System," *Imaging and Applied Optics 2015*, OSA Technical Digest, Optical Society of America (OSA), 2015, pp. JW3A.5.1–3. Presented at *Computational Optical Sensing and Imaging (COSI)*, Arlington, VA, June 7–11, 2015, doi:10.1364/AOMS.2015.JW3A.5.

- [11] Basel Salahieh, Jeffrey J. Rodriguez, and Rongguang Liang, "Computational Depth-Variant Deconvolution Technique for Full-Focus Imaging," *Imaging and Applied Optics 2015*, OSA Technical Digest, Optical Society of America (OSA), 2015, pp. CT3F.5.1-3. Presented at *Computational Optical Sensing and Imaging (COSI)*, Arlington, VA, June 7-11, 2015, doi:10.1364/COSI.2015.CT3F.5.
- [12] Sundaresh Ram and Jeffrey J. Rodriguez, "Single Image Super-Resolution Using Dictionary-Based Local Regression," *2014 IEEE Southwest Symp. on Image Analysis and Interpretation*, San Diego, CA, April 6-8, 2014, pp. 121-124, doi:10.1109/SSIAI.2014.6806044.
- [13] Sree Ramya S. P. Malladi, Sundaresh Ram, and Jeffrey J. Rodriguez, "Superpixels Using Morphology for Rock Image Segmentation," *2014 IEEE Southwest Symp. on Image Analysis and Interpretation*, San Diego, CA, April 6-8, 2014, pp. 145-148, doi:10.1109/SSIAI.2014.6806050.
- [14] Rohit C. Philip, Sundaresh Ram, Xin Gao, and Jeffrey J. Rodriguez, "A Comparison of Tracking Algorithm Performance for Objects in Wide Area Imagery," *2014 IEEE Southwest Symp. on Image Analysis and Interpretation*, San Diego, CA, April 6-8, 2014, pp. 109-112, doi:10.1109/SSIAI.2014.6806041.
- [15] José A. Rosado-Toro, Tomoe Barr, Jean-Philippe Galons, Marilyn T. Marron, Alison Stopeck, Cynthia Thomson, María I. Altbach, and Jeffrey J. Rodriguez, "Automated Segmentation of Breast Fat-Water MR Images Using Empirical Analysis," *2013 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing (ICIP)*, Vancouver, Canada, May 26-31, 2013, pp. 1018-1022, doi:10.1109/ICASSP.2013.6637803.
- [16] Sundaresh Ram and Jeffrey J. Rodriguez, "Symmetry-Based Detection of Nuclei in Microscopy Images," *2013 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing (ICIP)*, Vancouver, Canada, May 26-31, 2013, pp. 1128-1132, doi:10.1109/ICASSP.2013.6637826.
- [17] Sundaresh Ram and Jeffrey J. Rodriguez, "Random Walker Watersheds: A New Image Segmentation Approach," *2013 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing (ICIP)*, Vancouver, Canada, May 26-31, 2013, pp. 1473-1477, doi:10.1109/ICASSP.2013.6637896.
- [18] Vincent P. A. Lonij, Vijai Thottathil Jayadevan, Adria E. Brooks, Jeffrey J. Rodriguez, Kevin Koch, Michael Leuthold, and Alexander D. Cronin, "Forecasts of PV Power Output Using Power Measurements of 80 Residential PV Installs," *38th IEEE Photovoltaic Specialists Conf. (PVSC)*, Austin, TX, June 3-8, 2012, pp. 3300-3305, doi:10.1109/PVSC.2012.6318280.
- [19] Vijai Thottathil Jayadevan, Jeffrey J. Rodriguez, Vincent P. A. Lonij, and Alexander D. Cronin, "Forecasting Solar Power Intermittency Using Ground-Based Cloud Imaging," *World Renewable Energy Forum (WREF)*, Denver, CO, May 13-17, 2012, pp. 2100-2106.
- [20] Sundaresh Ram, Jeffrey J. Rodriguez, and Giovanni Bosco, "Size-Invariant Cell Nucleus Segmentation in 3-D Microscopy," *2012 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Santa Fe, NM, April 22-24, 2012, pp. 37-40, doi:10.1109/SSIAI.2012.6202447.
- [21] Jose A. Rosado-Toro and Jeffrey J. Rodriguez, "Cell Splitting Using Dynamic Programming," *2012 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Santa Fe, NM, April 22-24, 2012, pp. 33-36, doi:10.1109/SSIAI.2012.6202446.
- [22] Abhinav K. Jha and Jeffrey J. Rodriguez, "A Maximum-Likelihood Approach for ADC Estimation of Lesions in Visceral Organs," *2012 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Santa Fe, NM, April 22-24, 2012, pp. 21-24, doi:10.1109/SSIAI.2012.6202443.
- [23] Renu M. Stephen, Denise J. Roe, Abhinav K. Jha, Haiyan Cui, Georgette Frey, Scott Squire, Ted P. Trouard, Jean P. Galons, Jeff J. Rodriguez [sic], Mathew [sic] A. Kupinski, Eric Outwater, Robert J. Gillies, Alison T. Stopeck, "Diffusion-Weighted MRI of the Liver: Parameters of Acquisition & Analysis & Predictors of Chemotherapy Response," *19th Annual ISMRM Scientific Meeting and Exhibition 2011*, Montreal, Canada, May 7-13, 2011, p. 1048.

- [24] Abhinav K. Jha, Matthew A. Kupinski, Jeffrey J. Rodriguez, Renu M. Stephen, and Alison T. Stopeck, "ADC Estimation in Multi-Scan DWMRI," in *Digital Image Processing and Analysis*, OSA Technical Digest (Optical Society of America, 2010), pp. DTuB3-1 to DTuB3-3. Presented at the OSA Topical Meeting, Digital Image Processing and Analysis (DIPA), Tucson, AZ, June 7–8, 2010.
- [25] Abhinav K. Jha, Jeffrey J. Rodriguez, Renu M. Stephen, and Alison T. Stopeck, "A Clustering Algorithm for Liver Lesion Segmentation of Diffusion-Weighted MR Images," *2010 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Austin, TX, May 23–25, 2010, pp. 93–96.
- [26] Abhinav K. Jha, Matthew A. Kupinski, Jeffrey J. Rodriguez, Renu M. Stephen, and Alison T. Stopeck, "ADC Estimation of Lesions in Diffusion-Weighted MR Images: A Maximum- Likelihood Approach," *2010 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Austin, TX, May 23–25, 2010, pp. 209–212.
- [27] Sundaresh Ram, Jeffrey J. Rodriguez, and Giovanni Bosco, "Segmentation and Classification of 3-D Spots in FISH Images," *2010 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Austin, TX, May 23–25, 2010, pp. 101–104.
- [28] Abhinav K. Jha, Matthew A. Kupinski, Jeffrey J. Rodriguez, Renu M. Stephen, and Alison T. Stopeck, "Evaluating Segmentation Algorithms for Diffusion-Weighted MR Images: A Task-Based Approach," in *Image Perception, Observer Performance, and Technology Assessment*, David J. Manning and Craig K. Abbey, Eds., Proc. of SPIE, vol. 7627, pp. 76270L-1 to 76270L-8. Presented at SPIE Medical Imaging 2010, San Diego, CA, Feb. 13–18, 2010. **Best paper award.**
- [29] Santosh V. Chapaneri and Jeffrey J. Rodriguez, "Content-Adaptive Macroblock Partitioning Scheme for Error Concealment of H.264/AVC Coded Video," *2009 IEEE Intl. Conf. on Image Processing (ICIP)*, Cairo, Egypt, Nov. 7–11, 2009, pp. 917–920.
- [30] Santosh V. Chapaneri and Jeffrey J. Rodriguez, "Low Complexity Error Concealment Scheme for Intra-Frames in H.264/AVC," *2009 IEEE Intl. Conf. on Image Processing (ICIP)*, Cairo, Egypt, Nov. 7–11, 2009, pp. 925–928.
- [31] S. Rajaraman, J. J. Rodriguez, C. Graff, M. I. Altbach, T. Dragovich, C. B. Sirlin, R. L. Korn, and N. Raghunand, "Automated Registration of Sequential Breath-Hold DCE-MRI Images," *Intl. Society for Magnetic Resonance in Medicine (ISMRM), 17th Scientific Meeting & Exhibition*, Honolulu, April 18–24, 2009, p. 5722.
- [32] Narasimhan Rajagopalan, Jeffrey J. Rodriguez, and Kathleen Dixon, "An Integrated Technique for Spot Volume Estimation in 3-D Human Cell Cultures: Watersnakes," *2008 IEEE Intl. Conf. on Image Processing (ICIP)*, San Diego, CA, Oct. 12–15, 2008, pp. 3004–3007.
- [33] Rohit C. Philip, Jeffrey J. Rodriguez, and Robert J. Gillies, "Seed Pruning Using a Multi- Resolution Approach for Automated Segmentation of Breast Cancer Tissue," *2008 IEEE Intl. Conf. on Image Processing (ICIP)*, San Diego, CA, Oct. 12–15, 2008, pp. 1436–1439.
- [34] Mehul B. Patel, Jeffrey J. Rodriguez, and Arthur F. Gmitro, "Effect of Gray-Level Re- Quantization on Co-Occurrence Based Texture Analysis," *2008 IEEE Intl. Conf. on Image Processing (ICIP)*, San Diego, CA, Oct. 12–15, 2008, pp. 585–588.
- [35] Mehul B. Patel, Jeffrey J. Rodriguez, and Arthur F. Gmitro, "Image Classification Based on Focus," *2008 IEEE Intl. Conf. on Image Processing (ICIP)*, San Diego, CA, Oct. 12–15, 2008, pp. 397–400.
- [36] Sunil Seepuri, Jeffrey J. Rodriguez, and David A. Elliott, "Automated 3-D Segmentation of Internal Hemoglobin in TEM Images," *2008 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Santa Fe, NM, March 24–26, 2008, pp. 117–120.
- [37] Luca Caucci, Harrison H. Barrett, Nicholas Devaney, and Jeffrey J. Rodriguez, "Statistical Decision Theory and Adaptive Optics: A Rigorous Approach to Exoplanet Detection," *Adaptive Optics: Analysis and Methods*, OSA Technical Digest, Vancouver, B.C., Canada, June 18-20, 2007, paper ATuA5.

- [38] Mingkuan Liu, Jeffrey J. Rodriguez, and Kevin M. McNeill, "An Adaptive Jitter Buffer Play-Out Scheme to Improve VoIP Quality in Wireless Networks," *Military Communications Conf. (MILCOM)*, Washington, D.C., October 23–25, 2006, pp. 1–5.
- [39] Natalia Gaviria, Kathleen L. Melde, Kevin M. McNeill, and Jeffrey J. Rodriguez, "Development of Array Distributions for Smart Antennas with Low Sidelobes, Interference-Nulling, and Effective Radiated Voltage Constraints," *2006 IEEE Intl. Symp. on Antennas and Propagation (AP-S)*, Albuquerque, NM, July 9–14, 2006, pp. 3323–3326.
- [40] Nikhil S. Rajguru, Jeffrey J. Rodriguez, Natarajan Raghunand, and Robert J. Gillies, "Enhanced Level-Set Approach to Segmentation of 3-D Heterogeneous Lesions from Dynamic Contrast Enhanced MR Images," *2006 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Denver, CO, March 26–28, 2006, pp. 71–75.
- [41] Neema K. Shetty and Jeffrey J. Rodriguez, "Equalized-Spectrum Watermarking Using Perceptual Modeling," *2006 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Denver, CO, March 26–28, 2006, pp. 1–5.
- [42] Vivek Shankar, Jeffrey J. Rodriguez, and Mark E. Gettings, "Texture Analysis for Automated Classification of Geologic Structures," *2006 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Denver, CO, March 26–28, 2006, pp. 81–85.
- [43] Saurabh Srivastava, Jeffrey J. Rodriguez, Andrew R. Rouse, Molly A. Brewer, and Arthur F. Gmitro, "Analysis of Confocal Microendoscope Images for Automatic Detection of Ovarian Cancer," *2005 IEEE Intl. Conf. on Image Processing (ICIP)*, Genoa, Italy, Sept. 11–14, 2005, vol. 1, pp. 1113–1116.
- [44] Chetankumar Krishnamurthy, Jeffrey J. Rodriguez, Natarajan Raghunand, Rebecca Theilmann, Nikhil Rajguru, and Robert Gillies, "Automated Lesion Tracking in Echo-Planar Diffusion-Weighted Liver MRI: An Active Contour Based Approach," *ISMRM 13th Scientific Meeting & Exhibition*, Intl. Society for Magnetic Resonance in Medicine, Miami, May 7–13, 2005.
- [45] Nikhil Rajguru, Jeffrey J. Rodriguez, M. Runquist, J. Neville, C. Howison, and Robert Gillies, "Automatic 3D Segmentation of High Resolution Breast Tumors in Mice Using Region Growing, Active Contours and Gradient Vector Flow," *ISMRM 13th Scientific Meeting & Exhibition*, Intl. Society for Magnetic Resonance in Medicine, Miami, May 7–13, 2005.
- [46] Saurabh Srivastava, Jeffrey J. Rodriguez, Andrew R. Rouse, Molly A. Brewer, and Arthur F. Gmitro, "Automated Texture-Based Identification of Ovarian Cancer in Confocal Microendoscope Images," in *Three-Dimensional and Multidimensional Microscopy: Image Processing and Acquisition XII*, Jose-Angel Conchello, Carol J. Cogswell, and Tony Wilson, Eds., Proc. of SPIE, vol. 5701, 2005, pp. 42-52, doi:10.1117/12.590592. Presented at BIOS 2005 at Photonics West 2005, San Jose, CA, Jan. 22–27, 2005.
- [47] Diljith M. Thodi and Jeffrey J. Rodriguez, "Prediction-Error Based Reversible Watermarking," *2004 IEEE Intl. Conf. on Image Processing (ICIP)*, Oct. 24–27, 2004, Singapore, vol. 3, pp. 1549–52.
- [48] Victor Gajendran and Jeffrey J. Rodriguez, "Chromosome Counting via Digital Image Analysis," *2004 IEEE Intl. Conf. on Image Processing (ICIP)*, Oct. 24–27, 2004, Singapore, vol. 5, pp. 2929–32.
- [49] Chetankumar Krishnamurthy, Jeffrey J. Rodriguez, and Robert Gillies, "Automated Segmentation of Liver Metastases in Diffusion-Weighted Echoplanar Images Using Region Growing and Snakes Based on Fuzzy Sobel Edge Detector," *ISMRM Twelfth Scientific Meeting and Exhibition*, Intl. Society for Magnetic Resonance in Medicine, Kyoto, Japan, May 15–21, 2004.
- [50] Mary L. Cassabaum, Donald E. Waagen, Jeffrey J. Rodriguez, and Harry A. Schmitt, "Unsupervised Optimization of Support Vector Machine Parameters," in *Automatic Target Recognition XIV*, Ivan Kadar, ed., Proc. of SPIE, vol. 5426(1), SPIE Defense & Security Symposium, Orlando, FL, April 13–15, 2004, pp. 316–325.

- [51] Diljith M. Thodi and Jeffrey J. Rodriguez, "Reversible Watermarking by Prediction Error Expansion," *2004 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Lake Tahoe, CA, March 28–30, 2004, pp. 21–25.
- [52] Chetankumar Krishnamurthy, Jeffrey J. Rodriguez, and Robert J. Gillies, "Snake-Based Liver Lesion Segmentation," *2004 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Lake Tahoe, CA, March 28–30, 2004, pp. 187–191.
- [53] Kirk W. Gossage, Cynthia M. Smith, Elizabeth M. Kanter, Lida P. Hariri, Alice L. Stone, Jeffrey J. Rodriguez, Stuart K. Williams, and Jennifer K. Barton, "Texture Analysis of Speckle in Optical Coherence Tomography Images of Tissue Phantoms," in *Advanced Biomedical and Clinical Diagnostic Systems II*, Gerald E. Cohn et al., Eds., Proc. SPIE, vol. 5318, 2004, pp. 140–150, doi:10.1117/12.529615. Presented at Photonics West, San Jose, CA, Jan. 25–26, 2004.
- [54] Kirk W. Gossage, Tomasz S. Tkaczyk, Jeffrey J. Rodriguez, and Jennifer K. Barton, "Texture Analysis for Tissue Classification of Optical Coherence Tomography Images," in *Advanced Biomedical and Clinical Diagnostic Systems*, Tuan Vo-Dinh et al., Eds. Proc. SPIE, vol. 4958, 2003, pp. 109–17. Presented at the Biomedical Optics Symp. (BIOS 2003) at Photonics West 2003, San Jose, CA, Jan. 26–28, 2003.
- [55] Shiva Murthi, Sundararajan Sankaranarayanan, Bo Xia, Jeffrey J. Rodriguez, and David W. Galbraith, "Improved Data Acquisition System for Digital Flow Cytometry," *2002 IEEE Intl. Symp. on Circuits and Systems (ISCAS)*, Scottsdale, AZ, May 26–29, 2002, vol. 1, pp. 669–72, doi:10.1109/ISCAS.2002.1009929.
- [56] Rexford D. Newbould, Jo Dale Carothers, Jeffrey J. Rodriguez, and W. Timothy Holman, "A Hierarchy of Physical Design Watermarking Schemes for Intellectual Property Protection of IC Designs," *2002 IEEE Intl. Symp. on Circuits and Systems (ISCAS)*, Scottsdale, AZ, May 26–29, 2002, vol. 4, pp. 862–5.
- [57] Mary L. Cassabaum, Jeffrey J. Rodriguez, Jack G. Riddle, and Donald E. Waagen, "Feature Analysis Using Millimeter-Wave Real Beam and Doppler Beam Sharpening Techniques," *2002 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Santa Fe, NM, April 7–9, 2002, pp. 101–5.
- [58] Khusro Sajid, Jo Dale Carothers, Jeffrey J. Rodriguez, and W. Timothy Holman, "Global Routing Methodology for Analog and Mixed-Signal Layout," *14th Annual IEEE Intl. ASIC/SOC Conf.*, Arlington, VA, Sept. 12–15, 2001, pp. 442–6.
- [59] Naveen Narayan, Rexford D. Newbould, Jo Dale Carothers, Jeffrey J. Rodriguez, and W. Timothy Holman, "IP Protection for VLSI Designs Via Watermarking of Routes," *14th Annual IEEE Intl. ASIC/SOC Conf.*, Arlington, VA, Sept. 12–15, 2001, pp. 406–10.
- [60] David L. Irby, Rexford D. Newbould, Jo Dale Carothers, Jeffrey J. Rodriguez, and W. Timothy Holman, "Watermarking of Standard-Cell Feedthroughs in Mixed-Signal Design," *2001 Southwest Symp. on Mixed-Signal Design (SSIAI)*, Austin, TX, Feb. 25–27, 2001, pp. 121–5.
- [61] David L. Irby, Rexford D. Newbould, Jo Dale Carothers, Jeffrey J. Rodriguez, and W. Timothy Holman, "Placement Watermarking of Standard-Cell Designs," *2001 Southwest Symp. on Mixed-Signal Design (SSMSD)*, Austin, TX, Feb. 25–27, 2001, pp. 116–20.
- [62] Rexford D. Newbould, David L. Irby, Jo Dale Carothers, Jeffrey J. Rodriguez, and W. Timothy Holman, "Mixed Signal Design Watermarking for IP Protection," *2001 Southwest Symp. on Mixed-Signal Design (SSMSD)*, Austin, TX, Feb. 25–27, 2001, pp. 110–15.
- [63] David L. Irby, Rexford D. Newbould, Jo Dale Carothers, Jeffrey J. Rodriguez, and W. Timothy Holman, "Low-Level Watermarking of VLSI Designs for Intellectual Property Protection," *13th Annual IEEE Intl. ASIC/SOC Conf.*, Washington, D.C., Sept. 13–16, 2000, pp. 136–40.
- [64] Bruce A. Thomas and Jeffrey J. Rodriguez, "Wavelet-Based Color Image Denoising," *2000 IEEE Intl. Conf. on Image Processing (ICIP)*, Vancouver, B.C., Canada, Sept. 10–13, 2000, vol. 2, pp. 804–7.

- [65] Te-shen Liang and Jeffrey J. Rodriguez, "A Modified Robust Embedding Scheme for Faithful Watermark Extraction," *2000 IEEE Intl. Conf. on Image Processing (ICIP)*, Vancouver, B.C., Canada, Sept. 10-13, 2000, vol. 1, pp. 419-22.
- [66] Te-shen Liang and Jeffrey J. Rodriguez, "Improved Watermark Robustness Via Spectrum Equalization," *2000 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, Istanbul, Turkey, June 5-9, 2000, vol. 4, pp. 1951-4.
- [67] Te-shen Liang and Jeffrey J. Rodriguez, "Robust Image Watermarking Using Inversely Proportional Embedding," *4th IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Austin, TX, April 2-4, 2000, pp. 182-6.
- [68] Phillip A. Mlsna and Jeffrey J. Rodriguez, "Efficient Indexing of Multi-Color Sets for Content-Based Image Retrieval," *4th IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Austin, TX, April 2-4, 2000, pp. 116-20.
- [69] Te-shen Liang and Jeffrey J. Rodriguez, "Robust Image Watermarking Using Robust Coefficients," in *Security and Watermarking of Multimedia Contents II*, Ping Wah Wong and Edward J. Delp III, Eds. Proc. SPIE, vol. 3971, 2000. Presented at the IS&T/SPIE Intl. Symp., Electronic Imaging 2000: Science & Technology, San Jose, CA, Jan. 23-28, 2000, pp. 326-35.
- [70] Bruce A. Thomas and Jeffrey J. Rodriguez, "Practical Implementation of Multirate Convolution for Multiresolution Image Processing," *1998 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, Tucson, AZ, April 6-7, 1998, pp. 217-22.
- [71] Pinkesh Shah, Pixuan Zhou, Jue Wu, Vaishali Ghiya, Indra Widjaja, Jeffrey J. Rodriguez, Jo Dale Carothers, and David Paldan, "Data Network Analysis Using NOVA," *1998 IEEE Intl. Performance, Computing and Communications Conf. (IPCCC)*, Tempe, AZ, Feb. 16-18, 1998, pp. 124-30.
- [72] Bruce A. Thomas, Robin N. Strickland, and Jeffrey J. Rodriguez, "Color Image Enhancement Using Spatially Adaptive Saturation Feedback," *IEEE Intl. Conf. on Image Processing (ICIP)*, Santa Barbara, CA, Oct. 26-29, 1997, vol. 3, pp. 30-3.
- [73] Mahesh Godavarti and Jeffrey J. Rodriguez, "An Improved Technique for Automated Image Histogram Thresholding," *8th Intl. Conf. on Signal Processing Applications & Technology (ICSPAT)*, San Diego, CA, Sept. 14-17, 1997, vol. 2, pp. 1125-29.
- [74] Phillip A. Mlsna, Qiang Zhang, and Jeffrey J. Rodriguez, "3-D Histogram Modification of Color Images," *IEEE Intl. Conf. on Image Processing (ICIP)*, vol. III, Lausanne, Switzerland, Sept. 16-19, 1996, pp. 1015-8.
- [75] Te-shen Liang and Jeffrey J. Rodriguez, "MR Cranial Image Segmentation — A Morphological and Clustering Approach," *IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, San Antonio, Texas, April 8-9, 1996, pp. 184-9.
- [76] Qiang Zhang, Phillip A. Mlsna, and Jeffrey J. Rodriguez, "A Recursive Technique for 3-D Histogram Enhancement of Color Images," *IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI)*, San Antonio, Texas, April 8-9, 1996, pp. 218-23.
- [77] Phillip A. Mlsna, Tingyang Liu, John M. Galbraith, Jo D. Carothers, Jeffrey J. Rodriguez, David Paldan, and Mary A. Bogner, "NOVA — An Interactive Network Design Visualization and Optimization Tool," *1996 IEEE Fifteenth Annual Intl. Phoenix Conf. on Computers and Communications (IPCCC)*, Scottsdale, AZ, March 27-29, 1996, pp. 413-9.
- [78] Christopher C. Yang and Jeffrey J. Rodriguez, "Saturation Clipping in the LHS and YIQ Color Spaces," in *Color Imaging: Device-Independent Color, Color Hard Copy and Graphic Arts*, J. Bares, Ed. Proc. SPIE, vol. 2658, 1996, pp. 297-307. Presented at the IS&T/SPIE Intl. Symp. on Electronic Imaging '96: Science & Technology, San Jose, CA, Jan. 27 – Feb. 2, 1996.
- [79] Jesse C. Ma and Jeffrey J. Rodriguez, "MR Image Segmentation Using a Fuzzy-Based Neural Network," *1995 IEEE Intl. Conf. on Neural Networks (ICNN)*, vol. 5, Perth, Australia, Nov. 27 – Dec. 1, 1995, pp. 2190-5.

- [80] Mahesh Godavarti, Jeffrey J. Rodriguez, Timothy A. Yopp, Georgina M. Lambert, and David W. Galbraith, "Neural Network Analysis of Digital Flow Cytometric Data," *Intl. Conf. on Neural Networks (ICNN)*, vol. 5, Perth, Australia, Nov. 27 – Dec. 1, 1995, pp. 2211–6.
- [81] Christopher C. Yang and Jeffrey J. Rodriguez, "Efficient Luminance and Saturation Processing Techniques for Bypassing Color Coordinate Transformations," *IEEE Intl. Conf. on Systems, Man and Cybernetics (ICSMC)*, vol. 1, Vancouver, Canada, Oct. 22–25, 1995, pp. 667–72, doi:10.1109/ICSMC.1995.537840.
- [82] Richard P. Mackey, Jeffrey J. Rodriguez, and Jo Dale Carothers, and Sarma B. K. Vrudhula, "A Single-Chip, Asynchronous Echo Canceller for High-Speed Data Communication," *Eighth Annual IEEE Intl. Application Specific Integrated Circuit Conf. and Exhibit*, Austin, Texas, Sept. 18–22, 1995, pp. 181–4.
- [83] Phillip A. Mlsna and Jeffrey J. Rodriguez, "Explosion of Multidimensional Image Histograms," *IEEE Intl. Conf. on Image Processing (ICIP)*, vol. 3, Austin, Texas, Nov. 13–16, 1994, pp. 958–62.
- [84] James L. Lee and Jeffrey J. Rodriguez, "Edge-Based Segmentation of 3-D Magnetic Resonance Images," *IEEE Intl. Conf. on Image Processing (ICIP)*, vol. 1, Austin, Texas, Nov. 13–16, 1994, pp. 876–80.
- [85] James L. Lee and Jeffrey J. Rodriguez, "Volumetric Segmentation of Magnetic Resonance Images," in *Applications of Digital Image Processing XVII*, A. G. Tescher, Ed., Proc. of SPIE, vol. 2298, 1994, pp. 652–61. Presented at the SPIE Intl. Symp. on Optics, Imaging, and Instrumentation, San Diego, CA, July 26–29, 1994.
- [86] Jesse C. Ma and Jeffrey J. Rodriguez, "Segmentation of Multidimensional MR Images Using a Fuzzy Neural Network," in *Applications of Digital Image Processing XVII*, A. G. Tescher, Ed., Proc. of SPIE, vol. 2298, 1994, pp. 636–43. Presented at the SPIE Intl. Symp. on Optics, Imaging, and Instrumentation, San Diego, CA, July 26–29, 1994.
- [87] Phillip A. Mlsna and Jeffrey J. Rodriguez, "Enhancement of Multispectral Images Using Histogram Explosion," in *Applications of Digital Image Processing XVII*, A. G. Tescher, Ed., Proc. of SPIE, vol. 2298, 1994, pp. 132–42. Presented at the SPIE Intl. Symp. on Optics, Imaging, and Instrumentation, San Diego, CA, July 26–29, 1994.
- [88] Jeffrey J. Rodriguez and J. K. Aggarwal, "Terrain Matching by Analysis of Aerial Images," *Third Intl. Conf. on Computer Vision (ICCV)*, Osaka, Japan, Dec. 4–7, 1990, pp. 677–81.
- [89] Jeffrey J. Rodriguez and J. K. Aggarwal, "Navigation Using Image Sequence Analysis and 3-D Terrain Matching," *IEEE-CS Workshop on Interpretation of 3D Scenes*, Austin, Texas, Nov. 27–29, 1989, pp. 200–7.
- [90] Jeffrey J. Rodriguez and J. K. Aggarwal, "Terrain Matching Using Image Sequence Analysis," in *Image Understanding and Machine Vision*, 1989 Technical Digest Series, vol. 14 (Optical Society of America, Washington, D. C., 1989), pp. 30–3. Presented at the OSA Topical Meeting on Image Understanding and Machine Vision, North Falmouth, MA, June 12–14, 1989.
- [91] Jeffrey J. Rodriguez and J. K. Aggarwal, "Quantization Error in Stereo Imaging," *IEEE Computer Society Conf. on Computer Vision and Pattern Recognition (CVPR)*, Ann Arbor, MI, June 5–9, 1988, pp. 153–8.
- [92] Jeffrey J. Rodriguez, "An Improved Bit-Reversal Algorithm for the Fast Fourier Transform," *IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, vol. 3., New York, NY, 1988, pp. 1407–10.
- [93] Jeffrey J. Rodriguez, Jae S. Lim, and Elliot Singer, "Adaptive Noise Reduction in Aircraft Communication Systems," *IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, vol. 1, Dallas, Texas, 1987, pp. 169–72.

Patent

- [1] U.S. Patent No. 10,204,413, entitled “System and Method That Expands the Use of Polar Dynamic Programming To Segment Complex Shapes,” with named inventors José Rosado-Toro, Jeffrey J. Rodríguez, Ryan Avery, and Aiden Abidov, issued on February 12, 2019.

Other Publications

- [1] Mohammad Sadegh Majdi, Mahesh Bharath Keerthivasan, Natalie M. Zahr, Jeffrey J. Rodriguez, and Manoj Saranathan, “Automated Segmentation of Thalamic Nuclei Using Convolutional Neural Networks” (abstract), ISMRM 27th Annual Meeting & Exhibition, Intl. Society for Magnetic Resonance in Medicine, May 11-16, 2019, Montreal, Canada.
- [2] Ramaprasad Kulkarni, Jeffrey J. Rodriguez, and Markus Tuller, “Semi-Automated Multiphase Segmentation of 4-D Micro-Computed Tomography Data of Porous Media” (abstract), ASA-CSSA-SSSA Intl. Annual Meeting, Soil Science Society of America, Tampa, FL, Oct. 22-25, 2017, doi: 10.2136/vzj2011.0082.
- [3] Ramaprasad Kulkarni, Marcel G. Schaap, Jeffrey J. Rodriguez, and Markus Tuller, “Synthesis of Sphere Packings for Evaluation of Image Segmentation Algorithms” (abstract), ASA-CSSA-SSSA Intl. Annual Meeting, Soil Science Society of America, Phoenix, AZ, Nov. 6-9, 2016, doi:10.13140/RG.2.2.16825.98403.
- [4] Ramaprasad Kulkarni, Jeffrey J. Rodriguez, and Markus Tuller, “Improved Surface Area Estimation Based on Surface Curvedness” (abstract), ASA-CSSA-SSSA Intl. Annual Meeting, Soil Science Society of America, Phoenix, AZ, Nov. 6-9, 2016, doi:10.13140/RG.2.2.30247.75684.
- [5] Douglas W. Todd, Rohit C. Philip, Maki Niihori, Jeffrey J. Rodriguez, and Abraham Jacob, “High-Throughput Behavioral Zebrafish Assay for Drug Development Targeting Hearing Loss” (abstract), AOS 149th Annual Meeting, American Otological Society, May 20-21, 2016, Chicago, IL. **Best poster award.**
- [6] José A. Rosado-Toro, Ryan Avery, María I. Altbach, Aiden Abidov, and Jeffrey J. Rodríguez, “Semi-Automated Segmentation of the Right Ventricle in 4-CH MR Images” (abstract), ISMRM 24th Annual Meeting & Exhibition, Intl. Society for Magnetic Resonance in Medicine, May 7-13, 2016, Singapore.
- [7] Sundaresh Ram, Stephen J. Howerton, Forest L. Danford, Urs Utzinger, Jeffrey J. Rodriguez, and Jonathan P. Vande Geest, “Racioethnic Differences in Biomechanical Environment of the Lamina Cribrosa” (abstract), *Investigative Ophthalmology & Visual Science*, vol. 57, no. 12, Sept. 2016, p. 3555. Presented at ARVO 2016 Annual Meeting, Assn. for Research in Vision and Ophthalmology, May 1-5, 2016, Seattle, WA.
- [8] José A. Rosado-Toro, Tomoe Barr, Jean-Philippe Galons, Marilyn T. Marron, Alison Stopeck, Cynthia Thomson, Patricia Thompson, Danielle Carroll, Eszter Wolf, María Altbach, and Jeffrey J. Rodríguez, “Automatic Segmentation of Breast Images Using Clustering and Dynamic Programming” (abstract), presented at the ISMRM 23rd Annual Meeting & Exhibition, Intl. Society for Magnetic Resonance in Medicine, May 30 – June 5, 2015, Toronto, Canada.
- [9] Srinivas L. Naik, Jeffrey J. Rodriguez, Nishant Kalra, and Vincent L. Sorrell, “Tricuspid Annular Plane Systolic Excursion (TAPSE) Revisited Using CMR,” *Journal of Cardiovascular Magnetic Resonance*, 2012, vol. 14, suppl. 1, Feb. 1, 2012, p. 299, doi:10.1186/1532-429X-14-S1-P299. Presented at the Society for Cardiovascular Magnetic Resonance (SCMR) 15th Annual Scientific Sessions, Orlando, FL, Feb. 2-5, 2012.
- [10] Phillip A. Mlsna and Jeffrey J. Rodriguez, “Gradient and Laplacian Edge Detection,” in *The Essential Guide to Image Processing, 2nd ed.*, Al Bovik, ed. San Diego, CA: Elsevier, 2009, Ch.19, pp. 495–524 (book chapter).

- [11] Narendhran Vijayakumar, Lars Ewell, and Jeffrey J. Rodriguez, Baldassarre Stea, "Inferior Brain Lesions Monitored Using Diffusion Weighted Magnetic Resonance Imaging" (abstract), presented at the Sino-American Network for Therapeutic Radiology and Oncology (SANTRO) Symp., August 28-30, 2008, Beijing, China.
- [12] Phillip A. Mlsna and Jeffrey J. Rodriguez, "Gradient and Laplacian Edge Detection," in *Handbook of Image and Video Processing*, 2nd ed., Al Bovik, ed. San Diego, CA: Academic Press, 2005, Sect. 4.13, pp. 535–553 (book chapter).
- [13] Cynthia M. Smith, Helen Y. S. Chen, Jeffrey J. Rodriguez, Jennifer K. Barton, Stuart K. Williams, and James B. Hoying, "Three Dimensional Analysis of Mural Cell Coverage in Microvascular Collagen Gels," *FASEB Journal* (Federation of American Societies for Experimental Biology), vol. 17, no. 4, supplement, p. 500 (abstract). Presented at Experimental Biology 2003, San Diego, CA, April 2003.
- [14] David Galbraith, Shiva Murthi, Sundararajan Sankaranarayanan, and Jeffrey Rodriguez, "Digital Flow Cytometry: An Improved Scheme for Pulse Capture and Cell Sorting" (abstract), in *Cytometry*, vol. 47, suppl. 11, 2002.
- [15] Phillip A. Mlsna and Jeffrey J. Rodriguez, "Gradient and Laplacian-Type Edge Detection," in *Handbook of Image and Video Processing*, Al Bovik, ed. San Diego, CA: Academic Press, 2000, pp. 415–32 (book chapter).
- [16] Jeffrey J. Rodriguez, David W. Galbraith, Bo Xia, Kusnadi, Timothy A. Yopp, Shiva Murthi, and Sundararajan Sankaranarayanan, "Digital Data Acquisition System for Flow Cytometric Analysis," in *Cytometry* (abstract). Presented at the XX Intl. Congress of the Intl. Society for Analytical Cytology (ISAC), May 20–25, 2000, Montpellier, France.
- [17] Jeffrey J. Rodriguez and David W. Galbraith, "Digital Data Acquisition System for Flow Cytometry" (abstract), Ninth Cytometry Development Workshop (Asilomar, CA), Oct. 1999.
- [18] Heidi Leising, Joseph M. Miller, John E. Greivenkamp, Kendel McCarley, Jeffrey J. Rodriguez, and David L. Guyton, "Quantification of the Brückner Test for Strabismus," *Investigative Ophthalmology & Visual Science*, vol. 35, no. 4, supplement, March 15, 1994, p. 2202 (abstract). Presented at the 1994 meeting of the Association for Research in Vision and Ophthalmology, Sarasota, FL.
- [19] Nick A. Zilmer, Jeffrey J. Rodriguez, Timothy A. Yopp, Georgina M. Lambert, and David W. Galbraith, "Digital Flow Cytometry," *Cytometry*, suppl. 7, 1994 (abstract). Presented at the 1994 Intl. Congress of the Intl. Soc. for Analytical Cytology (ISAC).
- [20] Jeffrey J. Rodriguez, "Vector-Based Techniques for Color Image Processing" (abstract), OSA Symp. on Multidimensional Image Processing (Toronto, Canada), Oct. 1993 (invited presentation).
- [21] Jeffrey J. Rodriguez, *Terrain Matching Using Image Sequence Analysis*. Ph.D. dissertation, Dept. of Electrical Engineering, The University of Texas at Austin, 1990. Also available as pub. no. 90–31700, UMI Dissertation Services, Ann Arbor, MI.
- [22] Jeffrey J. Rodriguez, *Adaptive Noise Reduction in Aircraft Communication Systems*. M.S. thesis, Dept. of Electrical Engineering, Massachusetts Institute of Technology, Cambridge, 1986. Also available as tech. report 756, M.I.T. Lincoln Laboratory, Lexington, MA, 1987.

Keynote/Plenary Presentations

- "Image Analysis Applications in Microscopy," Plenary Speaker, 2008 IEEE Southwest Symp. on Image Analysis and Interpretation, Santa Fe, NM, March 26, 2008.
- "Texture Analysis for Automated Classification of Digital Images," Keynote Speaker, Seventh IASTED Intl. Conf. on Signal and Image Processing, Honolulu, HI, August 15, 2005.

Other Presentations without Proceedings

Shaun Pacheco, Basel Salahieh, Guoan Zheng, Thomas D. Milster, Jeffrey Rodriguez, and Rongguang Liang, "Reflective Fourier Ptychography" (presentation), in *Design and Quality for Biomedical Technologies IX*, Proc. SPIE 9700 (Ramesh Raghavachari and Rongguang Liang, eds.), 97000P, doi:10.1117/12.2236358. Presented at SPIE BIOS, San Francisco, CA, Feb. 13-18, 2016.

"Video Processing System for Zebrafish Behavioral Assay," Invited Speaker, Arizona Cancer Center Collaborative Cancer Grand Rounds, Tucson, AZ, Sept. 18, 2015.

"Automated Detection and Segmentation of FISH Spots," Invited Speaker, 2011 Arizona Imaging and Microanalysis Society Annual Meeting, Tucson, AZ, March 24, 2011.

"Color Image Enhancement and Coordinate Systems," Invited Speaker, IEEE Signal Processing Society Phoenix Chapter, May 1992.

"Digital Image Processing," Tutorial Speaker, IEEE Intl. Phoenix Conf. on Computers and Communication, April 1992.

"Color Image Enhancement Techniques," Invited Speaker, Dept. of Computer Science, University of California at Santa Barbara, April 1991.

Grants and Contracts

National Institutes of Health / National Institute of Biomedical Imaging and Bioengineering, Grant No. 1UH2EB022623-01, "Low-Cost Mobile Oral Cancer Screening for Low Resource Setting," co-investigator (with R. Liang), 9/1/2016 – 8/31/2018.

The Sensor Group LLC, "Automated Analysis of Images of Electric Power Equipment," principal investigator, 5/23/2016 – 8/22/2016.

National Institutes of Health / National Eye Institute, Grant No. R01EY020890, "Extracellular Matrix Organization and Biomechanics of the Lamina Cribrosa and Peripapillary Sclera," co-investigator starting Jan. 2015 (with J. P. Vande Geest), Aug. 2011 – July 2016.

National Institutes of Health / National Heart, Lung, and Blood Institute, Grant No. T32HL007955, "Cardiovascular Biomedical Engineering Training Grant," participant starting July 2014 (with J. Barton, PI), May 2000 – June 2016.

Google Inc., "Computational Depth-Based Restoration Technique for Full-Focus Imaging," co-investigator (with R. Liang), 9/1/2014 – 9/1/2015.

National Institutes of Health / National Cancer Institute, Grant No. CA023074, "Cancer Center Support Grant," principal investigator (with D. S. Alberts and other principal investigators), July 2009 – June 2014.

University of Arizona Technology Research Initiative Fund, TRIF Imaging Fellowship for student (R. Kulkarni), "Multiphase Segmentation of 3-D CT Images of Porous Materials," co-investigator (with M. Tuller), Aug. 2013 – May 2014.

Split Engineering LLC, "Image Analysis for Rock Particle Segmentation," principal investigator, May 2012 – May 2013.

NSF I/UCRC Connection One, "Content-Adaptive Improved Error Concealment Method for H.264/AVC Encoded Video Streaming," principal investigator, Jan. 2008 – June 2008.

National Institutes of Health / National Institute of Biomedical Imaging and Bioengineering, "Graduate Training in Biomedical Imaging and Spectroscopy," Grant No. 5T32EB000809-05, participant (with A. Gmitro et al.), May 2003 – April 2008.

National Institutes of Health, "Advanced Intravital Microscope," participant (with U. Utzinger et al.), April 2007 – March 2008.

National Institutes of Health / National Cancer Institute, "Diagnosis of Ovarian Cancer by Confocal Microendoscopy," Grant No. 5R01CA115780-03, co-investigator (with A. F. Gmitro), July 2005 – June 2009.

National Science Foundation Industry/University Research Center (I/UCRC), "Connection One: Communication Circuits and Systems Center," Grant No. EEC-0333046, principal investigator, July 2003 – June 2008.

Texas Instruments, NSF I/UCRC Connection One Membership, Aug. 2005 – June 2008.

Analog Devices, NSF I/UCRC Connection One Membership, July 2003 – June 2008.

Raytheon, NSF I/UCRC Connection One Membership, July 2003 – June 2008.

BAE Systems, "Modeling and Simulation of MANET, IPv6 Interfaces and Optical Switching Architectures for Advanced Mobile Network-Centric Platforms," co-investigator (with K. M. McNeill), Oct. 2003 – Sept. 2007 (my involvement began July 2005).

NSF I/UCRC Connection One, "Integrated Management/Control Plane Architecture with VoIP Application," principal investigator, Aug. 2005 – Aug. 2006.

BAE Systems, NSF I/UCRC Connection One Membership, Jan. 2004 – June 2006.

Cisco Systems, NSF I/UCRC Connection One Membership, July 2003 – June 2006.

NSF I/UCRC Connection One, "Adaptive Voice Quality Enhancement Mechanisms for VoIP," coinvestigator (with K. M. McNeill), Aug. 2004 – Aug. 2006.

NSF I/UCRC Connection One, "Integrated Management Control Plane Architecture for Heterogeneous Networks," co-investigator (with K. M. McNeill), Aug. 2003 – July 2005 (my involvement began July 2005).

State of Arizona Prop. 301 Information Technology Committee, "Connection One: Communication Circuits and Systems Center," principal investigator, July 2003 – June 2006.

National Science Foundation, "Planning Grant for NSF I/UCRC Connection One: Communication Circuits and Systems Center," Grant No. EEC-0245729, principal investigator, Feb. 2003 – Jan. 2004.

The University of Arizona Prop. 301 Small Grants Program in Imaging and Image Science, "Automated Analysis of Chromosome Images for Cytogenetic Applications," principal investigator, Jan.–Dec. 2002.

UA Office of the Dean of Students, "Student/Faculty Interaction Program," principal investigator (with J. D. Carothers), Aug. 2001 – Dec. 2002.

National Institutes of Health, "Wavelet Analysis of Flow Cytometric Information," co-investigator (with D. W. Galbraith), Sept. 1998 – Sept. 2001.

National Science Foundation, "Flow Cytometry: Digital Processing of Molecular Information," Grant No. BIR-9604929, co-investigator (with D. W. Galbraith), Feb. 1997 – Jan. 2001.

UA College of Engineering, Arizona Software Institute, "A Software Toolbox for Multimedia Indexing and Retrieval," principal investigator, July 1999 – Feb. 2000.

Hughes Missile Systems Company, "Signature Prediction of Targets Given 2-D Views," principal investigator, Nov. 1996 – June 1997.

National Science Foundation, "Flow Cytometry: Digital Processing of Molecular Information," Grant No. BIR-9513602, co-investigator (with D. W. Galbraith), March 1996 – Feb. 1997.

Hughes Missile Systems Company, "Reference Generation with Gray Shade Signature Overlay," principal investigator, Feb. 1996 – June 1997.

Motorola, Inc. (SSTG), "Telecommunications Analysis," co-investigator (with J. D. Carothers and I. Widjaja), Aug. 1996 – Dec. 1996.

Motorola, Inc. (GSTG), "Optimization for Data Visualization," co-investigator (with J. D. Carothers and I. Widjaja), Jan. 1996 – Dec. 1996.

Motorola, Inc. (GSTG), "Optimization for Data Visualization," co-investigator (with J. D. Carothers), Feb. 1995 – Jan. 1996.

National Science Foundation, "Flow Cytometry: Digital Processing of Molecular Information," Grant No. BIR-9116067, co-investigator (with D. W. Galbraith), July 1992 – Dec. 1995.

Motorola, Inc. (GSTG), "Optimization for Data Visualization," co-investigator (with J. D. Carothers and M. K. Liu), Jan. 1995 – Dec. 1995.

AT&T Foundation, "Digital Retrieval and Visualization of 3-D Magnetic Resonance Images," principal investigator, Oct. 1994 – Oct. 1995.

Hughes Missile Systems Company, "Reconstruction of 3-D Geometry of Objects from Limited Views," principal investigator, July 1994 – July 1995.

Texas Instruments, Inc., software donation, TMS320C30 C-compiler/assembler/linker package, April 1995.

Motorola, Inc. (GSTG), "Multidimensional Algorithms for Biomedical Image Analysis," principal investigator, May 1994 – Feb. 1995.

National Science Foundation, "Digital Image Archiving and Viewing Station," Grant No. CDA- 9212524, co-investigator (with R. A. Schowengerdt and R. N. Strickland), Sept. 1992 – Aug. 1994.

University of Arizona, Office of Vice President for Research, "Coordinate Systems for Processing Digital Color Images," principal investigator, Jan. 1992 – Dec. 1992.

National Science Foundation, "Color Image Enhancement and Segmentation for Computer Vision," Grant No. IRI-9112350, principal investigator, July 1991 – Sept. 1992.

EXHIBIT B

DOCUMENTS CONSIDERED BY JEFFREY J. RODRIGUEZ, PH.D.**PLEADINGS**

Date	Dkt. No.	Description
7/29/2020	Dkt. 42	Plaintiff Intellectual Tech LLC's Opening Claim Construction Brief
7/29/2020	Dkt. 42-1	U.S. Patent No. 7,233,247 B1
7/29/2020	Dkt. 42-2	Ex Parte Reexamination Certificate No. 7,233,247 C1
7/29/2020	Dkt. 42-3	Letter Mehta to Bagley, July 14, 2020
7/29/2020	Dkt. 42-4	Letter Mehta to Bagley, July 15, 2020
7/29/2020	Dkt. 42-5	Letter Mehta to Bagley, July 16, 2020
7/29/2020	Dkt. 42-6	Response to Office Action dated September 21, 2006 (IT000072-IT00082)
7/29/2020	Dkt. 42-7	Bluetooth Special Interest Group and the USB Implementers Forum (IT022798)
7/29/2020	Dkt. 42-8	USB Implementers Forum (IT022799-IT022800)
7/29/2020	Dkt. 42-9	Specification of the Bluetooth System (IT003677-IT005143)
7/29/2020	Dkt. 42-10	Universal Serial Bus 3.0 Specification
7/29/2020	Dkt. 42-11	July 8, 2020 Defendant's Preliminary Disclosure of Extrinsic Evidence
7/29/2020	Dkt. 42-12	July 13, 2020 Defendant's First Amended Preliminary Disclosure of Extrinsic Evidence
7/29/2020	Dkt. 42-13	Specification of the Bluetooth System (IT024333-IT025109)
7/29/2020	Dkt. 42-14	Universal Serial Bus Specification
7/29/2020	Dkt. 42-15	Current Bluetooth SIG "About Us" page
7/29/2020	Dkt. 42-16	Current USB IF "About" page
7/29/2020	Dkt. 43	Defendant's Opening Claim Construction Brief
7/29/2020	Dkt. 43-1	U.S. Patent No. 7,233,247 B1
7/29/2020	Dkt. 43-2	U.S. Patent <i>Ex Parte</i> Reexamination Certificate No. 7,233,247 C1
7/29/2020	Dkt. 43-3	September 21, 2006 Office Action filed in connection with the prosecution of U.S. Patent Application No. 11/039,
7/29/2020	Dkt. 43-4	January 16, 2007 Office Action filed in connection with the prosecution of U.S. Patent Application No. 11/039,
7/29/2020	Dkt. 43-5	October 19, 2006 Amendment filed in connection with the prosecution of U.S. Patent Application No. 11/039,221
7/29/2020	Dkt. 43-6	February 9, 2007 Amendment filed in connection with the prosecution of U.S. Patent Application No. 11/039,221
7/29/2020	Dkt. 43-7	April 25, 2007 Notice of Allowance filed in connection with the prosecution of U.S. Patent Application No. 11/039,221
7/29/2020	Dkt. 43-8	September 1, 2017 Request for <i>Ex Parte</i> Reexamination of U.S. Patent No. 7,233,247 filed in connection with the reexamination of Application No. 90/014,010
7/29/2020	Dkt. 43-9	October 10, 2017 Decision on Request for <i>Ex Parte</i> Reexamination of U.S. Patent No. 7,233,247 filed in connection with the reexamination of Application No. 90/014,010

Date	Dkt. No.	Description
7/29/2020	Dkt. 43-10	January 29, 2018 Office Action filed in connection with the reexamination of Application No. 90/014,010
7/29/2020	Dkt. 43-11	June 29, 2018 Office Action filed in connection with the reexamination of Application No. 90/014,010
7/29/2020	Dkt. 43-12	August 29, 2018 Amendment filed in connection with the reexamination of Application No. 90/014,010
7/29/2020	Dkt. 43-13	February 5, 2019 Amendment filed in connection with the reexamination of Application No. 90/014,010
7/29/2020	Dkt. 43-14	Declaration of Dr. Jacob Sharony
7/29/2020	Dkt. 43-15	U.S. Patent Application Publication No. US2006/0174130 A1
7/29/2020	Dkt. 43-16	Document Library Listing USB Specifications, IT022801-08
7/29/2020	Dkt. 43-17	Excerpt from Bluetooth Core Specification, Revision: v5.2, Revision Date: 2019-12-31, IT018954-22209
8/19/2020	Dkt. 44	Plaintiff Intellectual Tech LLC's Response to Zebra Technologies Corporation's Claim Construction Brief
8/19/2020	Dkt. 44-1	8/29/2018 Reexamination Response to Second Office Action
8/19/2020	Dkt. 44-2	2/9/2007 Response to Second Office Action
8/19/2020	Dkt. 44-3	4/18/2007 Notice of Allowability
8/19/2020	Dkt. 44-4	10/19/2006 Response to First Office Action
8/19/2020	Dkt. 44-5	U.S. Patent Application Publication No. 2006/0174130 A1
8/19/2020	Dkt. 44-6	9/1/2017 Request for <i>Ex Parte</i> Reexamination of U.S. Patent No. 7,233,247
8/19/2020	Dkt. 44-7	5/31/2018 Reexamination Response to First Office Action
8/19/2020	Dkt. 44-8	6/29/2018 Second Non-Final Action
8/19/2020	Dkt. 44-9	12/6/2018 Final Rejection
8/19/2020	Dkt. 44-10	4/15/2019 Notice of Intent to Issue <i>Ex Parte</i> Reexamination Certificate
8/19/2020	Dkt. 44-11	3/21/2019 Reexamination Response to Final Office Action
8/19/2020	Dkt. 44-12	Zebra's ET5X Enterprise Table User Guide for Android™ Version 6.0.1. IT022259-IT022404 (IT022353)
8/19/2020	Dkt. 44-13	Zebra's TC56 Touch Computer User Guide for Android™ Version 6.0.1IT022577-IT022780 (IT022723)
8/19/2020	Dkt. 45	Defendant's Responsive Claim Construction Brief
8/19/2020	Dkt. 45-1	U.S. Patent Application Publication No. 2006/0065730 A1
8/19/2020	Dkt. 45-2	U.S. Patent Application Publication No. 2004/0249250 A1
8/19/2020	Dkt. 45-3	July 14, 2020 Letter from Hersh Mehta to Niky Bagley
8/19/2020	Dkt. 45-4	"A Summary of RFID Standards" (Jan. 16, 2005), produced by Plaintiff as IT022781-83
8/19/2020	Dkt. 45-5	"Document Library USB-IF" produced by Plaintiff as IT022801-08
8/19/2020	Dkt. 45-6	"Specification of the Bluetooth System," Version 1.1 (Feb. 22, 2001) (excerpted) produced by Plaintiff as IT023249-332
8/19/2020	Dkt. 45-7	"Specification of the Bluetooth System," Version 2.0 (Nov. 4, 2004) (excerpted) produced by Plaintiff as IT024333-25562
8/19/2020	Dkt. 45-8	"RFID Standards: ISO, IEC, EPCglobal" produced by Plaintiff at IT022784-85

Date	Dkt. No.	Description
9/3/2020	Dkt. 46	Defendant's Reply Claim Construction Brief
9/3/2020	Dkt. 47	Plaintiff Intellectual tech LLC's Reply to Zebra Technologies Corporation's Responsive Claim Construction Brief
9/3/2020	Dkt. 47-1	U.S. Patent No. 8,902,760 (Austermann, III et al.)
9/3/2020	Dkt. 47-2	Intellectual tech LLC's Disclosure of Proposed Claim Constructions
10/05/2020	Dkt. 52	Claim Construction Order
10/13/2020	Dkt. 54	Zebra's Motion for Summary Judgment of Invalidity Under 35 U.S.C. 112 (pursuant to Dkt. 50)
10/13/2020	Dkt. 54-1	U.S. Patent No. 7,233,247 B1
10/13/2020	Dkt. 54-2	<i>Ex Parte</i> Reexamination Certificate No. 7,233,247 C1
10/13/2020	Dkt. 54-3	Office Action dated September 21, 2006 as filed with the U.S. Patent & Trademark Office ("USPTO") in connection with U.S. Patent Application No. 11/039,221
10/13/2020	Dkt. 54-4	Office Action dated January 16, 2007 as filed with the USPTO in connection with U.S. Patent Application No. 11/039,221.
10/13/2020	Dkt. 54-5	Amendment dated October 19, 2006 as filed with the USPTO in connection with U.S. Patent Application No. 11/039,221
10/13/2020	Dkt. 54-6	Amendment dated February 9, 2007 as filed with the USPTO in connection with U.S. Patent Application No. 11/039,221.
10/13/2020	Dkt. 54-7	Notice of Allowance dated April 25, 2007 as filed with the USPTO in connection with U.S. Patent Application No. 11/039,221
10/13/2020	Dkt. 54-8	Request for Ex Parte Reexamination dated September 1, 2017 as filed with the USPTO
10/13/2020	Dkt. 54-9	Decision dated October 10, 2017 as filed with the USPTO in connection with U.S. Reexamination Application No. 90/014,010
10/13/2020	Dkt. 54-10	Office Action in Ex Parte Reexamination dated January 29, 2018 as filed with the USPTO in connection with U.S. Reexamination Application No. 90/014,010
10/13/2020	Dkt. 54-11	Office Action in Ex Parte Reexamination dated June 29, 2018 as filed with the USPTO in connection with U.S. Reexamination Application No. 90/014,010
10/13/2020	Dkt. 54-12	Response dated August 29, 2018 as filed with the USPTO in connection with U.S. Reexamination Application No. 90/014,010
10/13/2020	Dkt. 54-13	Response dated February 5, 2019 as filed with the USPTO in connection with U.S. Reexamination Application No. 90/014,010
11/05/2020	Dkt. 57	Order Denying in Part Defendant's Motion for Summary Judgment

OTHER DOCUMENTS

U.S. Patent No. 7,233,247 B1

U.S. Patent No. 7,233,247 C1 *Ex Parte* Reexamination Certificate

Original File History

Reexam File History